

# BULLETIN OF MISCELLANEOUS INFORMATION No. 1 1926 ROYAL BOTANIC GARDENS, KEW

## I.—TAXONOMIC AND GENETICAL NOTES ON SOME SPECIES OF NEMOPHILA. R. J. CHITTENDEN and W. B. TURRILL.

It is proposed to deal here with only those species of *Nemophila* of which some varieties have been studied in living material. An attempt has been made to delimit the species discussed by the application of evidence derived from observation of living plants, experimental breeding work, herbarium examination, and cytology. The results published here suffer from the limitations that (1) neither of us has studied the genus in its native habitats, (2) that seeds of some of the so-called varieties of *N. Menziesii* have not been available, (3) that the material used in the experiments was not grown from wild seeds of known locality.

As every naturalist is aware, no consistency in the use of the term species has ever been arrived at. Even within the limits of a single genus, whether of animals or of plants, the greatest diversity, both as to standard and as to practical application of any standard, obtains. Nevertheless, utilizing the comprehensive formula that a species is a group of individuals presenting close morphological and physiological relationships and capable of freely interbreeding, we believe this paper to be of value in providing examples of the delimitation of closely associated groups by the fact that they are unable to breed together, though they have been united as a single species. We would suggest that a revision of other groups on lines similar to those here followed, namely, by the correlation of the results of both systematic observation and genetic experiment would at least contribute towards a more uniform application of the conception of specificity, and to a classification according more closely with physiological fact. The vegetative distinctions as seen in living plants, between the six species of *Nemophila* discussed are, fortunately, sharp, and inter-sterility between the species, where we have shown it to exist, is complete.

In 1923 experiments were started at the John Innes Horticultural Institution, Merton, with *Nemophilas* bearing the following names:—*N. insignis grandiflora*, *N. crambeoides*, *N. atomaria atrocoerulea*, *N. Menziesii*, *N. atomaria*, *N. discoidalis*, *N. maculata*. In 1924 other plants were received from Benary as follows:—*N. insignis alba*, *N. insignis marginata*, *N. crambeoides alba*, *N. discoidalis marmorata*, *N. discoidalis auriculata*, *N. discoidalis argentea*, *N. australis integrifolia* and *N. aurita*.

Apart from differences in flower colour and pattern, the varieties mentioned above fall into six well-marked groups when classified on their vegetative appearance. These groups coincide with *N. aurita* and *N. maculata*, and the four sub-species of *N. Menziesii* as given by Brand in Das Pflanzenreich iv. 251 (1913). The classification adopted by Brand for those species of *Nemophila* with which this paper deals is given below, our plants being grouped under the name of that species or sub-species to which they must be relegated on this system.

Haploid chromosome number.*	Species.	Sub-species.	Horticultural designations.
9	<i>N. aurita</i>		
9	<i>N. maculata</i>		
	<i>N. Menziesii</i>	<i>insignis</i> (group 1.)	<i>grandiflora</i> . <i>grandiflora alba</i> . Large flowered pale mauve.
9		<i>liniflora</i> (group 2.)	<i>crambeoides</i> <i>atomaria atrocoerulea</i> <i>crambeoides oculata albo-n</i> . <i>crambeoides alba</i> . Purplish blue with spotted eye.
9		<i>atomaria</i> (group 3.)	<i>atomaria</i> <i>discoidalis</i> <i>discoidalis marmorata</i> <i>discoidalis auriculata</i> <i>discoidalis argentea</i> . " Ghost."
		<i>australis</i> (group 4.)	" <i>integrifolia</i> ."

\* From the numbers so far ascertained it appears that  $n=9$  is the basic chromosome number for the genus *Nemophila*. In the neighbouring genus *Phacelia* the number  $n=11$  has been found in the species so far examined.

The two species *N. maculata* and *N. aurita* can be very briefly considered. They have been described frequently and their status as species is not in question. *N. maculata* dates from Benth. ex Lindl. in Journ. Hort. Soc. iii. 319 adn. et 320 cum icone (1848). It is limited to the Sierra Nevada and the coast range in California, and is said to extend from Butte County to Tulare County. All the specimens at Kew are from the western hills of the Sierra Nevada, around Sacramento, Amador, Placer, and Auburn. *N. aurita* dates from Lindl. Bot. Reg. xix. t. 1601 (1833). The exact boundaries of its natural distribution are somewhat doubtful. It has been recorded from Plumas County but had possibly escaped

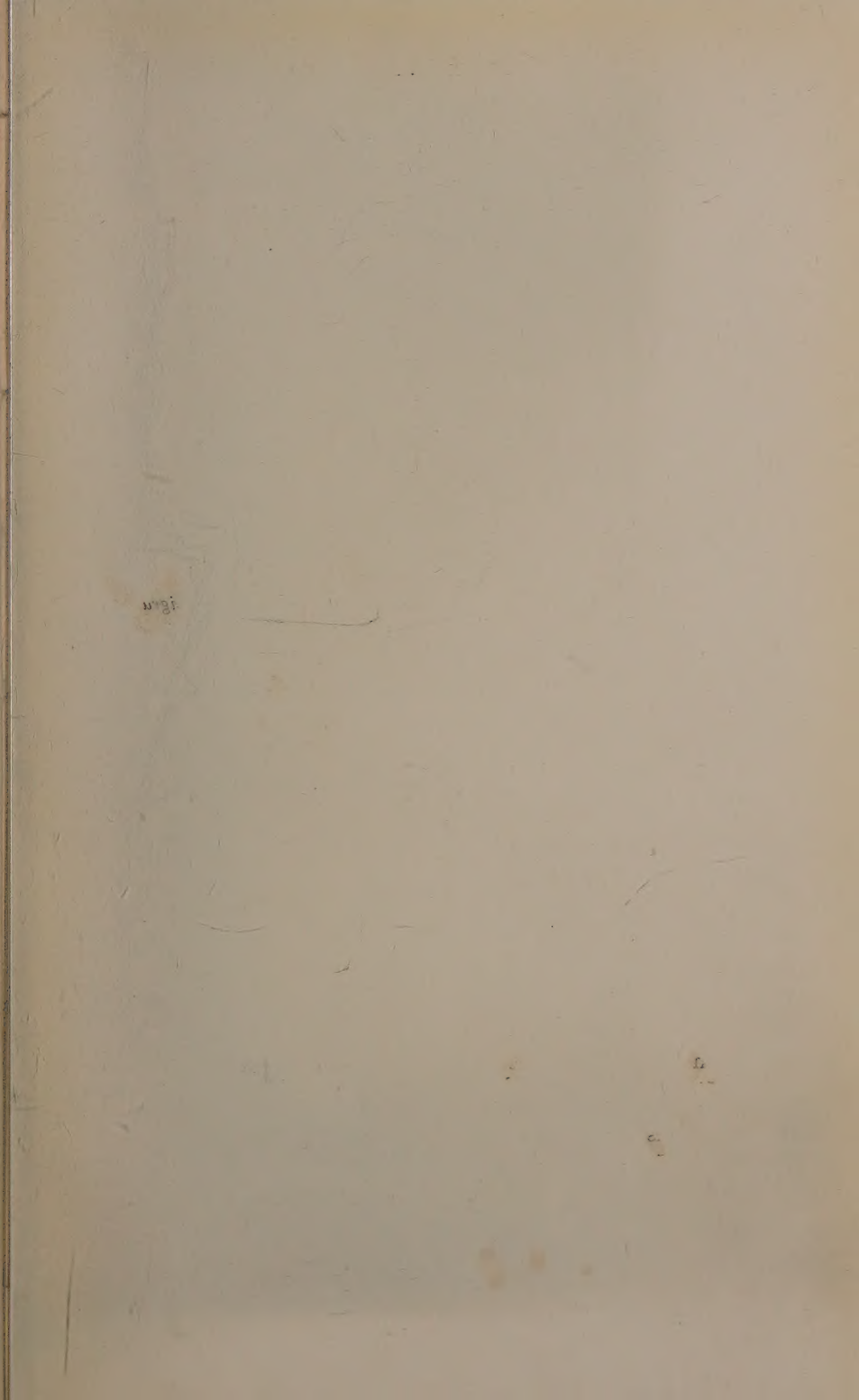
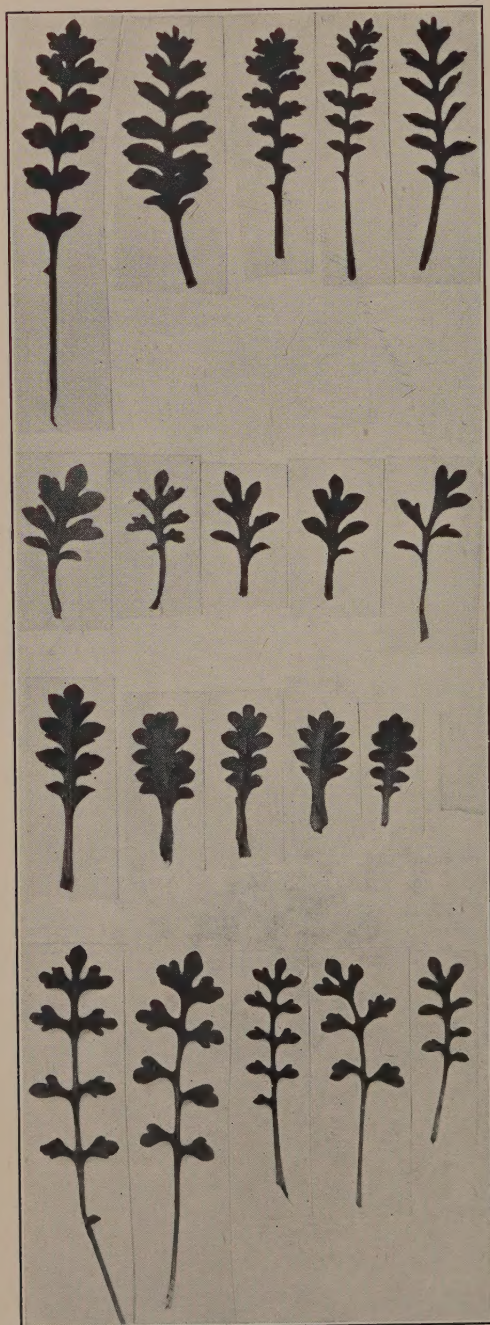




PLATE II.



*N. insignis.*

*N. liniflora.*

*N. atomaria.*

*N. integrifolia.*

from cultivation. At Kew there are specimens from Santa Clara Co., just south of San Francisco, from Ventura Co., St. Barbara, Santa Catalina Is., and south to San Diego Co. The var. *arizonica* Brand [*N. arizonica* M. E. Jones in Contrib. West. Bot. xii. 50 (1908)] is represented by a specimen from the Sierra Tucson (Pringle).

We come now to the more perplexing groups of plants collectively to be known as *N. Menziesii* sensu Brand. Before considering this name it will be best to deal with the four sub-species of Brand. These, it is shown below, are isolated by being incapable of crossing one with another and are therefore to be considered as separate species.

1. *N. insignis* Douglas ex Benth. in Trans. Linn. Soc. xvii. 275 (1835) et Trans. Hort. Soc. 2nd ser. i. 479 (1835). This is morphologically an easily distinguishable plant, recognized by its large monochrome (usually clear blue) corollas. Its characters are very constant in cultivation and the range of variation is, in our experience, not great. It is common in gardens and has been frequently figured, as in Lindley, Bot. Reg. xx. t. 1713 (1835) and Bot. Mag. t. 3485 (1836). Geographically it is distributed in California from the San Francisco district to the Mexican border at San Diego. There is no doubt about the nomenclature although Douglas collected plants of other species as well, and these have sometimes been mounted on the same sheets as specimens of *insignis*.

2. *N. liniflora* Fisch. et Mey. Sert. Petropol. t. 8 (1846). The excellent figure and description of the original publication makes certain the correct application of this name to plants with flowers generally smaller than those of *insignis*, corollas with well-marked usually coloured veins, and the "eye" spotted or solid black (except in white forms). The reflexed hairs on the stem and pedicel are also characteristic. Geographically the species is limited to the region around San Francisco. Specimens at Kew are from San Bruno Hills, San Mateo County, Sonoma County and Santa Clara County.

3. *N. atomaria* Fisch. et Mey. Ind. Sem. Hort. Petropol. ii. 42 (1835). This species is morphologically very closely related to the last. The thicker texture of the leaves, the colourless margins to the corolla lobes, and the greater development of spots, stripes, or solid colour serve to distinguish it. Figures of it will be found in Bot. Reg. t. 1940 (1837) and Bot. Mag. t. 3774 (1840). The variety *discoidalis* is figured in Flor. d. Serres ii. Aug. 1846. t. 7. The species is said by Brand to occur from Oakland in southern Oregon to Santa Cruz County in California. The wild material at Kew is insufficient to check this statement.

4. *N. integrifolia* Abrams Fl. Los Angeles 321 (1904). It is unfortunate that this unsuitable name has to be used, the more so that the specimens of the Merton experiments are not the *N. Men-*



*ziesii* var. *integrifolia* Parish in *Erythraea* vi. 91 (1898) although they must be placed, in Brand's classification, under his subsp. *australis*. Judging from the meagre description and the solitary sheet at Kew (Hall 3081), our plants come nearest to the var. *incana* Brand. Living material of the var. *integrifolia* of Parish, of authentic var. *incana* Brand, of var. *annulata* Chandler and of var. *minima* Brand is not at present available. If these groups interbreed with one another and with our plants, as is probable, they will almost certainly be found to form one species isolated by not being fertile with other species. On the rules of nomenclature the name *N. integrifolia* has to be given to this species, and a number of varieties placed under it, including our plants, which are not, however, the var. *integrifolia*. Using the combination *N. integrifolia* as here suggested it is of interest to note that the species is geographically limited to the south-west of California from Los Angeles and San Bernardino to San Diego. It has normally smaller corollas than *N. insignis*, *N. liniflora*, or *N. atomaria*.

There remain for mention four specimens whose like we have not seen amongst living plants:

(1) San Bruno Hills, San Francisco, Apr. 1903, *C. F. Baker* 1895, determined by Miss Eastwood as *N. insignis* Dougl. form., and the number quoted by Brand as *N. Menziesii* subsp. *insignis* var. *typica*. We should not hesitate to place this in *insignis* except for the fact that spots occur on the lower parts of the corollas.

(2) Amador County, Irishtown, *Hansen* 87, the number quoted by Brand under *N. Menziesii* subsp. *insignis* var. *typica*. The narrow leaf-segments and spots on the lower parts of the corollas separate this from *insignis* as we know it in the living condition,

(3) Hills near Berkeley, Alameda County, *H. P. Chandler* 6076, number quoted by Brand under *M. Menziesii* subsp. *liniflora* var. *intermedia*. The hairs of the stem and pedicels are not closely adpressed and reflexed.

(4) Potter Valley, Merdoc County, *C. A. Purpus* 1099, with the hairs spreading, reflexed or slightly ascending.

It is probable that Nos. (1) and (2) are to be placed under *N. insignis* and Nos. (3) and (4) under *N. liniflora*, but without studying living plants showing the combination of characters seen in these specimens we are not sure.

We have now to consider the name *Nemophila Menziesii*. It was first applied in Hooker and Arnott, "The Botany of Captain Beechey's Voyage," p. 152 (1833). No definite specimen is quoted and the description is insufficient to determine the species intended—that is as species are understood by us. In the Supplement to the same work, p. 372 (1840), a better description is given under the same name, and two varieties are made  $\alpha$  and  $\beta$ . The latter is, from the synonymy and figures quoted, *N. insignis* Benth.,

the former is probably *N. liniflora* Fisch. et Mey. The specimens from Hooker's herbarium at Kew are too poor to decide the question. The name *N. liniflora* is accompanied by a good description and by an excellent coloured figure and there is no ambiguity in its use. We propose therefore to retain it and to consider the name *N. Menziesii* Hook. et Arn. as ambiguous when used for one of the species as accepted in this paper.

The table of characters on the following pages has been drawn up from living specimens. The descriptions apply to normal living plants grown under normal conditions. Some exceptions to the descriptions are:—

1. In hot, dry weather, such as the early summer of last year (1925), the amount of anthocyanin in the plant becomes greater than usual, and even the leaves often become purplish-red.
2. The flower size is usually very constant. Some flowers, however, on an otherwise normal plant may be very small, such reduction in size is usually accompanied by contabescence of the anthers, though the female parts may be normally functional. Further, toward the end of the flowering season both flower shape and size may be affected, size being much reduced and in *atomaria* petals may become narrower as they are in *liniflora*.
3. Meristic variation is frequent. On an otherwise normal plant a flower or flowers may show:—4 or 6 instead of 5 petals, tri- or multi-fid stigmas instead of bifid ones, capsules 3- or 4-valved instead of 2-valved.
4. The reflexed appendages of the calyx may be wanting, particularly in *atomaria*.
5. The flower colour is affected by heat or drought, for instance the white rim of the petal characteristic of all *atomaria* varieties may on some or all flowers of a plant become purple.

#### FLOWER COLOUR AND PATTERN.

A description of flower colour in these plants is rendered easier if the corolla be regarded as divided into four zones, w, x, y, and z, of which z is the innermost and w the outermost zone (see diagram p. 10).



<i>N. insignis.</i>	<i>N. liniflora.</i>
<p><b>Habit.</b> When young a close rosette. Later erect and loosely branched, finally prostrate. Plant larger than <i>liniflora</i>, <i>atomaria</i> or <i>australis</i>.</p>	<p>The plant does not form a close rosette when young and soon becomes prostrate and loosely branched.</p>
<p><b>Stem.</b> Brittle, rounded and slender.</p>	<p>As in <i>insignis</i>.</p>
<p><b>Anthocyanin.</b> If present is localized in the leaf axils and the bases and apices of the stems.</p>	<p>Usually present, may be confined to the leaf axils, bases and apices of the stem, or may be general over the plant.</p>
<p><b>Hairs.</b> Plant hairy all over, hairs on the stem and pedicel are adpressed and ascending.</p>	<p>As in <i>insignis</i>, hairs on the stem and pedicel are adpressed but reflexed.</p>
<p><b>Leaf.</b> Usually 2-4 times as long as broad. Lobing deep and regular, 4-7 pairs of lobes. Lobes usually with 1 to 2 pairs of lobules. Small white air spaces on the leaf.</p>	<p>Usually 1-1½ times as long as broad. Lobing not so deep or so regular as in <i>insignis</i>, 1-3 pairs of lobes, lobes narrow usually with only one lobule on the anterior margin of the lobe. White air or black anthocyanin blotches on the leaf, never both on the same plant. No apparent correlation between the amount of anthocyanin in the stem and the character of the blotches on the leaf.</p>
<p><b>Calyx.</b> Sepals 5, broad, large, tapering to the apex, with a small reflexed appendage in each sinus.</p>	<p>As in <i>insignis</i>, but smaller.</p>
<p><b>Corolla.</b> Gamopetalous, rotate-campanulate, 5-partite. White hairs on the upper surface at the base. Petals broad, blunt and overlapping.</p>	<p>Gamopetalous, smaller than in <i>insignis</i>, funnel-shaped, 5-partite. White hairs on the upper surface at the base. Petals usually narrow blunt and not over-lapping.</p>
<p><b>Nectaries.</b> On the upper surface opposite to and at the base of each petal they are deeply depressed and show as raised areas on the under surface of the corolla. They are formed by a pleat in the corolla and the two edges (or scales) of the pleat though not fused completely over-arch.</p>	<p>As in <i>insignis</i>, but not so deeply depressed, no raised areas on the under surface.</p>



<i>N. atomaria.</i>	<i>N. integrifolia.</i>
<p>Erect when young, later prostrate. Plant is lighter and brighter green than in <i>integrifolia</i>, <i>insignis</i>, <i>liniflora</i>. Plant larger than <i>liniflora</i>.</p>	<p>Erect when young, later may become prostrate.</p>
<p>As in <i>insignis</i>, but thicker, more succulent and brighter green.</p>	<p>As in <i>insignis</i>.</p>
<p>Only present at the apices of the stem near the flower buds.</p>	<p>Only present at the apices of the flower stalk.</p>
<p>As in <i>liniflora</i>.</p>	<p>Usually not adpressed on the stems and pedicels, but sometimes directed in a downward direction. The whole plant is hairy.</p>
<p>Usually 1-2 times as long as broad. Lobing regular, not so deep as in <i>insignis</i>, 3-5 pairs of lobes. Lobes rounded, rarely subdivided. Leaf without white or black spots or blotches.</p>	<p>Usually 1½ to 3 times as long as broad. Lobing deep regular. Lobes usually bearing lobules only on the anterior margin and usually only one lobule to each lobe. Large white spots on the upper surface.</p>
<p>Arrangement as in <i>insignis</i>, but smaller and sepals narrower, lighter green and more bluntly pointed than in <i>insignis</i> or <i>liniflora</i>.</p>	<p>As in <i>liniflora</i>.</p>
<p>Gamopetalous, smaller than in <i>insignis</i>, rotate, 5-partite. White hairs on the upper surface at the base. Petals broad, blunt and over-lapping.</p>	<p>Gamopetalous, rotate - pateriform, 5-partite. White hairs on the upper surface at the base. Petals usually narrow, blunt and not over-lapping.</p>
<p>As in <i>insignis</i>, but not depressed and nectaries open and not over-arched.</p>	<p>Widely open in older flowers. The pleats very hairy, the so-called scales with a free, acute, upwardly directed portion.</p>

<i>N. insignis.</i>	<i>N. liniflora.</i>
<p><i>Androecium.</i> Filaments white, glabrous, anthers brown when young, black after dehiscence. Anthers introrse, attachment versatile. Pollen white. Stamens epipetalous alternating with the petals.</p>	<p>As in <i>insignis</i>.</p>
<p><i>Gynoecium.</i> Style and ovary covered with short hairs. Style bifid at the apex. Stigmatic surfaces black, rounded when receptive.</p>	<p>As in <i>insignis</i>, but stigmatic surface brown when young, black or bluish and rounded when receptive.</p>
<p><i>Flower.</i> Axillary, pedicel long and erect.</p>	<p>As in <i>insignis</i>.</p>
<p><i>Capsule.</i> Pedicel reflexed after fertilisation and the capsule is held inverted till it dehisces. Dehiscence by a single central split into two valves. Seeds 8-10, irregular in shape, rounded, brown and wrinkled. A well-marked white or pale brown caruncle marks the point of placentation.</p>	<p>As in <i>insignis</i>.</p>
<p><i>Flower colour.</i> "Eye" (central area of the corolla) never spotted or coloured. Rim of the petal never white except in a wholly white flower. <i>Colours observed</i> :—deep blue, pale mauve, white.</p>	<p>"Eye" either spotted or solid black, except no spotted eye exists in the white flowered forms. Colour always much deeper at the veins, pale blue, purplish blue, white.</p>
<p><i>Maturity.</i> Comes into flower much later than <i>atomaria</i> or <i>liniflora</i> if sown at the same time.</p>	<p>Comes into flower before <i>insignis</i> or <i>atomaria</i> if sown at the same time.</p>

<i>N. atomaria.</i>	<i>N. integrifolia.</i>
As in <i>insignis</i> .	As in <i>insignis</i> , but filaments purplish at base.
As in <i>insignis</i> , but stigmatic surfaces brown or white and rounded when receptive.	As in <i>insignis</i> , but stigmata black when young and blue and rounded when ripe.
As in <i>insignis</i> .	As in <i>insignis</i> , but pedicel short.
As in <i>insignis</i> .	As in <i>insignis</i> .
<p>Rim of the petal white, never coloured. Colour may be solid or in the form of spots, stripes or mottles; reddish black, red, brownish white, slatey blue to purplish blue. No pure white has ever been seen.</p> <p>Comes into flower after <i>liniflora</i> and before <i>insignis</i> if sown at the same time.</p>	<p>Deepest and bluest colour at periphery of corolla but traces of colour throughout. Hairs at base of corolla look purple to the eye because of pale purple background but are white under microscope, long and coarse; 3 to 5 nearly black spots at base of each lobe.</p>



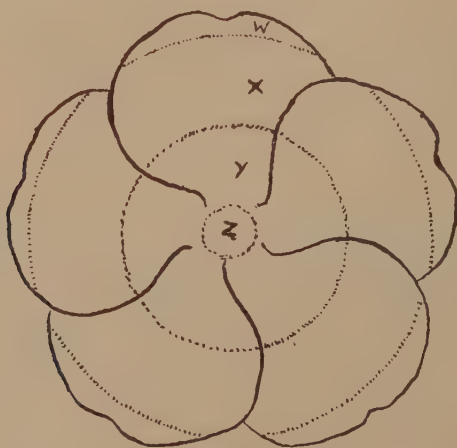
On the upper surface of the corolla the distribution is as follows:—

Zone z is white in all except *integrifolia*. The distribution of colour in the other zones varies in the different groups:—

*N. insignis*.—In other than pure white-flowered forms zone y is always white, zones x and w are not differentiated the one from the other and are blue or mauve. The flower is never spotted or striped with colour.\*

*N. liniflora*.—In other than pure white-flowered forms zone y is full black or spotted with black, zones x and w are not differentiated from each other and are pale blue, purplish-blue to purple or white.†

*N. atomaria*.—No pure white form has been observed. Zone w is colourless in all varieties, zones x and y are not distinct from each other except in two varieties (*auriculata* and *marmorata*) and may be spotted with black, or uniformly slaty-blue to bluish-purple, reddish-black, bright red, or faint brownish-white. The two exceptions are:—variety *auriculata* in which zone y bears separate stripes of reddish-black or bright red, and zone x is white; variety *marmorata* in which zone y is mainly of a faint brownish-white and zone x is mainly of a reddish-black or bright red colour.



\* In normal flowers the colour is never in the form of stripes or spots, but an irregular mosaic type has been observed in which zones x and w show varying proportions of blue and white. The distribution is not regular and may vary from flower to flower or from petal to petal. Such unstable forms are only to be compared with types showing mottled and irregular sectorial variegation of the foliage.

† In *liniflora* an otherwise white flower may have a full black zone y, yet no white-flowered type has yet been observed in which zone y is spotted with black.

*N. integrifolia*.—Only one colour variety has so far been seen. The distribution is nearly as in *N. liniflora*, zone y being spotted with black and zones x and w not definitely differentiated from each other and pale purplish-blue, but zone y is of a pale purple colour which extends right up to the corolla base.

Further points of interest in the distribution of the flower colour in these types are:—

1. In all flowers of *liniflora* and *atomaria* where spots or stripes occur on the flower they follow the lines of the veins.

2. In *N. liniflora* the tissue in the immediate vicinity of the veins is always a region of more intense colouration; and coloured flowers, particularly the paler varieties, present a strongly veined appearance. In *N. atomaria* the same tendency is noticeable in some varieties but is not readily visible except when the flower is placed between the source of light and the observer. In *N. insignis* there is no appreciable deepening of colour near the veins.

3. *N. australis* differs from the other varieties in having a very marked deepening of the colour at the periphery of the petals. This is sometimes to be observed in varieties of *N. liniflora* but is in these cases, as far as our observations go, a temporary fluctuation.

As F<sub>2</sub> and backcross data are only available for two crosses, (e.g. *N. liniflora* var. *crambeoides* ♀ x *N. liniflora* var. *atrocoerulea* ♂, and its reciprocal and for *N. atomaria* type ♀ x *N. atomaria* var. *discoidalis* ♂ and its reciprocal) it would be premature to advance any definite scheme for the inheritance of colour and pattern in these species of *Nemophila*. The general statements below rest on the evidence of reciprocal F<sub>1</sub>s between all varieties and on the F<sub>2</sub> and backcross data already available.

In *N. insignis* in zones x and w blue is dominant to mauve and white; mauve and white crossed together give a blue F<sub>1</sub>.

In *N. liniflora* in zones x and w pale colours are dominant to deep colours; colour is dominant to white, though the white may carry the dominant colour-modifiers. In zone y colour in the form of spots is dominant to full colour.

In *N. atomaria* in zones x and y colour in the form of spots is dominant to striped colour in zone y only. The var. *marmorata* is recessive to all uniformly coloured types except the "ghost" variety in which zones z and y are of a uniform brownish-white.

As a result of breeding trials it was found that:—

1. *N. aurita* and *N. maculata* would not cross either way with any other type or with each other.

2. Within the so-called species *Menziesii* it was found that the four previously described groups were completely unable to cross with each other or with any other species.

3. The varieties within each of these four groups of *N. Menziesii* sensu Brand were fully fertile when crossed with another

variety of the same group, forming hybrids whose segregation in later generations was normal.

On the grounds of the complete sterility existing between these four groups of *N. Menziesii* sensu Brand combined with their morphological differentiation it appears unreasonable to regard them all as varieties or sub-species of the same species. It is proposed therefore to dispense with the name *N. Menziesii* and to accept each of its four component groups as species under the names *N. insignis* Doug., *N. liniflora* Fisch. & Mey., *N. atomaria* Fisch. & Mey. and *N. integrifolia* Abrams.

## II.—THE GAMBLE HERBARIUM

In May last the late Mr. J. S. Gamble handed me a document in which he had set out the history of the Herbarium he had built up during his long life, and expressed to me the desire of himself and Mrs. Gamble to present this magnificent collection to the Nation and that it should be kept in the Herbarium of the Royal Botanic Gardens, Kew. The details of this valuable presentation are given in the letters which follow and in Mr. Gamble's document.

A portion of the collection was received from Mr. Gamble on July 14th. The remaining portion, which Mr. Gamble retained at Liss in connection with his work on the Madras Flora, was received on December 1st, 1925, from Mrs. Gamble.

In addition to the Phanerogamic specimens, Mr. Gamble also made large collections of Mosses, Hepaticae and Lichens during his service in India, and after his retirement he turned his attention to the British Bryophyta, and these collections are included in the presentation.

The whole collection is now stored in the Herbarium in Mr. Gamble's own cases and is available for study. The specimens will be incorporated in the General Herbarium as soon as may be possible, in accordance with Mr. Gamble's wishes.

Mr. Gamble also presented to Kew his very valuable and interesting collection of hand specimens of Indian timbers, which have been placed in No. 4 Museum, where they are available for study by Forestry students. In addition, Mrs. Gamble has presented a selection of botanical books to the Library, some of which are of special value as they contain Mr. Gamble's careful annotations.

A. W. H.

" May 10th, 1925.

" Royal Botanic Gardens, Kew.

" My dear Gamble,

" I have read the story of your Herbarium with very great interest and I hope one day you will allow me to publish it with fuller details as to its contents.

" Now comes the important matter, to which you refer in the last few lines. If you really desire to present your valuable collection to the Nation, to be kept at Kew, then I have no hesitation



in saying how much I, personally, should welcome the gift, and the Ministry, I know, would appreciate it fully.

"As you do not express a desire that it should be kept separate, the reception of the collection should present no great difficulty, though, as you know, cabinet accommodation in the herbarium is now becoming a serious matter.

"You do not say whether you would like to present some of the collection during your lifetime—which I hope may long continue—but should such a proposal be in your thoughts I fancy we could make arrangements in consultation with you that would be agreeable to you.

"I will not write more now, as obviously many matters must be discussed with you and Mr. Cotton and myself. If I have understood your meaning correctly I can only conclude with an expression of my very deep appreciation of your kindness and generosity.

"I am, etc.

"(Sgd.) ARTHUR W. HILL."

"May 22nd, 1925.

"Highfield, East Liss,

"My dear Hill,

"I am very much obliged to you for your kind letter of May 10th, written after you had read the brief story of my Herbarium, and I am very glad indeed to think that the Kew Herbarium would welcome it as an addition to the public collection. I write therefore to offer it to you formally as a gift to the Nation to be added to the Herbarium at Kew and disposed of there as you and the Keeper think best. If it is incorporated in the regular collection and duplicates are found, I should like such of them as you may not want to be offered to the Department of Botany at the Natural History Museum and to any others of the public collections in this country.

"On hearing from you of its acceptance formally, I should like to ask that I may retain, on loan, for my present use in the preparation of the Madras Flora, most of the specimens of the *Monochlamydeae* and Monocotyledons, but all the rest, including the ferns and mosses, would be at once available and could be moved to Kew as you may arrange.

"As I think you have seen, most of the specimens are in pigeon-hole boxes, in which they can be moved straight away, but some of them may have to be taken out and made into bundles so that I can keep the boxes which will be very useful to me during the progress of the work on which I am engaged. The ferns, *Cupuliferae* and some others that are not likely to be wanted for my Flora are packed in cases and can be removed at once.

"I am, etc.

"(Sgd.) J. S. GAMBLE."

"27th May, 1925.

"Royal Botanic Gardens, Kew.

"My dear Gamble,

"Many thanks for your letters of May 22nd. Your letter offering your Herbarium to Kew is exactly what I wanted and my delay

in answering you is due to the fact that I am having all the documents typed to send up to the Ministry of Agriculture.

"I can and do, as Director of Kew, accept your gift with most grateful thanks, and no doubt you will receive an official letter from the Ministry in the course of a few days.

\* \* \* \* \*

"I think you know that I am in no hurry to deprive you of your collections, but only wish to meet your own views with regard to the transfer of such portions of your collection as you feel you no longer wish to keep at Highfield.

"(Sgd.) ARTHUR W. HILL."

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#### HISTORY OF THE COLLECTION.

"I began collecting when a student at the French National Forest School at Nancy in 1869-1871 where we all had to submit Herbaria, but in addition to the Herbarium of woody plants sent in, I also collected all kinds chiefly in early morning walks in the country. I named my specimens as far as possible with the help of Grenier and Godron's "*Flore de Lorraine*." In vacation time and on other visits abroad I also collected in Switzerland and South Germany also in North Italy. I left my specimens at home when I went to India and added to them a small collection made by my father, somewhere about 1830, probably in Italy. He was a Naval Surgeon, Harpur Gamble, M.D. Edin. They were all afterwards mounted and added to the Indian collections.

"My first province in India was Burma, but I collected little there as my station was on the river bank among rice fields and not very near the forests. On my transfer to Bengal I was posted to the Darjeeling Forests and then I started regular collecting, at first chiefly of trees and shrubs for the preparation of my Darjeeling List which was published by the Bengal Government. My friend, Sulpiz Kurz, then Curator of the Calcutta Herbarium, helped me very largely with the naming and Dr. (later Sir George) King the Superintendent of the Calcutta Gardens mounted for me my chief set in exchange for the gift of my second set. I continued to collect as opportunity offered, all kinds later on, with the help of a Lepcha collector whom I employed privately and who did splendid work for me. All specimens collected were roughly named and numbered, dated and localised, almost every day, in the evenings. I was in the Darjeeling and Jalpaiguri Districts from 1872 to 1877 with one short visit to Allahabad and another to the Simla Hills where I added a great many new specimens. In 1877 I was transferred to Head Quarters and again collected about Simla chiefly in company with Major (later Sir Henry) Collett and Mr. H. F. Blanford, F.R.S., the Meteorologist. I was also given two considerable collections from the hills of Chamba made by Mr. B. H. Baden-Powell, B.C.S., and Mr. Robert Ellis, Forest Officer. In 1879

I returned to Bengal as Conservator of Forests and my tours took me to other parts of the Province, the Sunderbans, Dacca, Chittagong, Chota Nagpore, Sonthal Parganas and Orissa so that I was able to add largely to the Herbarium and to publish lists of the Forest vegetation of nearly all. I also had the great benefit, on several excursions, of collecting in company with Mr. C. B. Clarke, F.R.S. In 1882 I was transferred to Madras and took my Herbarium with me. I was able to add to my collections in all the Districts in which I travelled as Conservator of the Northern Circle, arranging and naming them at times when I could consider myself "off duty". I was helped with specimens by many Madras Forest Officers and I received many good ones from Mr. W. A. Talbot from the Bombay Presidency and later from Mr. Lace from Burma, Baluchistan and elsewhere. The Herbarium had then grown to some size and was getting rather unwieldy but I moved it up to Dehra Dun when I was transferred in 1890 to the North-Western Provinces and the charge of the Forest School. It remained at Dehra Dun till I retired and brought it home in 1899. While in the N.-W. Provinces I was able to make good collections in the Dun and the Hills of Jaunsar and Tehri-Garhwal right up to the glaciers of the Upper Tonse Valley. Mr. J. F. Duthie, then in charge of the Saharanpur Gardens, who had also been my companion on many tours, gave me many specimens of his collecting in various parts of Northern India and friends like Mr. C. G. Rogers, Pundit Keshvanand and Rai Bahadur U. N. Kanjilal added many of value. At one time I lost, probably in transit, a few specimens, chiefly ferns, Euphorbias and Oaks. The distribution of my own collections was made regularly from the very beginning. After the first set which I kept, the next, as already stated, went to Calcutta, the rest to Saharanpur or Madras or Dehra Dun, also some to the British Museum at the request of Mr. Carruthers and others to friends like Mr. Talbot and Mr. C. B. Clarke. The only ones that reached Kew were those I gave to Mr. Clarke, as Sir Joseph Hooker had always said that direct gifts were not wanted. I was not very surprised as I knew that he had even refused collections from Sir G. King and the Calcutta Gardens. I expect that the real reason was the want of room at that time. I should mention that while on a short visit to the Cape of Good Hope in 1890 I collected a good deal in the neighbourhood of Cape Town, heaths especially. After my retirement in 1899 from Indian Service, I was able to add to the collection specimens of the British Flora and also many collected in travel on the Continent, in Switzerland, Italy, Sardinia, Malta, Gibraltar, also in South Norway. I also received many specimens from Mr. H. C. Levinge, Mr. H. F. Blanford and others. I have always dried good specimens from my own and other gardens to help in naming what my friends submit to me. I should mention that Dr. H. Christ, of Basel, was good enough to give me a number of valuable Swiss and other specimens. The whole collection, which the late Sir G. King who knew it well referred to in his address to Section K



at the Dover Meeting of the British Association in 1899 as "probably the largest collection of plants ever owned in India," numbers, at a guess, perhaps 50,000 sheets, and its eventual destination is a subject that my wife and I are now seriously considering. It is not fully representative enough to stand by itself for purposes of study and it is very likely that its best use will be to supplement existing collections. We do not wish it to leave this country or be sold, but before deciding anything we should like advice on the question.

" (Sgd.) J. S. GAMBLE.

*May 3rd, 1925."*

" The Mosses and Hepaticae consist of my own collection and the duplicates of his that Mr. J. F. Duthie gave me. We had collected many of them in company. The naming was done for me, so far as it was completed, by Dr. Brotherus of Helsingfors and Mr. Boswell of Oxford. Their respective handwritings can be very easily recognised. I was always interested in Mosses but official duties and the collection and study of Phanerogams made it impossible to work at them in India. But when at home on furlough in the years 1896-97, I was living at Guildford and began to make my British Collection and to work out the names with the help of 'Dixon and Jameson' and 'Braithwaite,' indispensable books. When I retired from Indian Service and came home, I had first the work of the Paris Exhibition of 1900 and then Sir G. King asked me to join him on the 'Malay Materials.' That work was followed by the 'Madras Flora' which I was asked by the Secretary of State for India (suggested, most likely, by the Government of Madras) to undertake, so that I had to give up any idea of continuing the interesting study of Mosses. I hope that some of my collections may be of value. I think they are all accurately localized geographically.

" I am also sending the 'numbering' books (a mss numerical list in ten books) which belong to the Gamble Herbarium. They have special lists also of the Ellis, Collett and Baden Powell Collections:

.. " (Sgd.) J. S. GAMBLE.

*" 20th July, 1925."*

" Secretary,

" I beg to enclose some very interesting correspondence I have had with Mr. J. S. Gamble, C.I.E., F.R.S., late of the Indian Forest Service, who is working at the present moment on the Flora of Madras for the Government of India. Mr. Gamble is a constant visitor at our Herbarium and we are indebted to him for many valuable presents in the past.

" You will see on reading the story of his Herbarium that he wishes to present his Herbarium to Kew and after a conversation with him, on receipt of his memorandum (Enclosure No. 1) entitled 'Gamble Herbarium' I wrote to him on May 10th, and enclose a

copy of my letter (Enclosure No. 2). Mr Gamble replied to that letter on May 22nd (Enclosure No. 3) and I have replied further to that letter on one or two minor points which he raises.

"I have accepted Mr. Gamble's very generous present, and I hope the Ministry will send a formal letter of thanks to Mr. Gamble for this very valuable gift.

" A. W. H.

" The Secretary,

" Ministry of Agriculture and Fisheries." "28th May, 1925."

" 6th June, 1925.

" Ministry of Agriculture.

" DEAR MR. GAMBLE,

" I have heard from the Director of Kew that you have presented to the Nation your very valuable Herbarium, and as the responsible Minister, I wish to convey to you the thanks of the Government for your very generous gift. The addition to the Kew Herbarium of your unique collection of specimens will contribute in no small degree to the maintenance of the pre-eminent position which Kew occupies in the world of botanical science. I understand that we have previously been indebted to you for many valuable presents and I wish, on my own behalf and on behalf of the Nation, to express my great appreciation of the generosity and patriotism which has prompted this final mark of your devotion to the cause of Botanical Science and of your keen desire to uphold the scientific fame of our country.

" Yours very truly,

" (Sgd.) EDWARD WOOD.

" J. S. Gamble, Esq., C.I.E., F.R.S.,

" Highfield, East Liss."

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### III.—THE TREATMENT OF LEPROSY BY VEGETABLE OILS.

The following contribution on Chaulmoogra and Hydnocarpus Oils has been prepared by Dr. T. A. Henry, Director of the Wellcome Chemical Research Laboratories.

The recent history of the successful use of these two oils in the treatment of leprosy begins with the discovery by Sir David Prain in 1901 that chaulmoogra oil is derived from *Taraktogenos Kurzii* King and not from *Gynocardia odorata* R. Br. as had been supposed up to that time. It thus became possible to secure well-authenticated material for chemical investigation.

In 1904, Dr. F. B. Power and his co-workers began the publication of the results of their chemical researches on this subject (Trans. Chem. Soc. 1904, vol. 85, pp. 838, 851; 1905, vol. 87, pp. 349, 884, 896; 1907, vol. 91, p. 557) which, among other

interesting facts elicited, showed that these two oils contain as their principal constituents chaulmoogric and hydnocarpic acids, the first of a new group of acids now known as the chaulmoogric series. These two acids proved to be closely related and to be unique among naturally-occurring fatty acids in having a cyclic structure and in being optically active. These results have been amply confirmed by later investigators and it has also been found that the same two acids occur in other species of *Hydnocarpus*, besides *H. wightiana* Blume and *H. anthelmintica* Pierre originally examined by Power (Brill; Phil. Journ. Sci. 1916, vol. 11, p. 75; 1917, vol. 12, p. 37), and in other genera such as *Asteriastigma macrocarpa* Bd. (Ghosh. quoted by Rock, U.S.A. Dept. Agric. Bulletin No. 1051) and *Oncoba echinata* Oliv. (Goulding and Akers, Proc. Chem. Soc. 1913, vol. 29, p. 197). The latter known as "Gorli" in Sierra Leone contains chaulmoogric but no hydnocarpic acid.

Although both chaulmoogra and hydnocarpus oils had long been known as remedies for leprosy and skin diseases, their value was regarded by medical men as uncertain, and as the oils obtainable were often dirty, rancid and unpleasant and were given by the mouth, it was not unusual for patients to be nauseated by them long before any good effect could be produced. Oral administration has now been almost entirely superseded by injection, and it is to the provision of derivatives of the oils suitable for this improved technique that recent progress in the treatment of leprosy is largely due. Material suitable for injection was available so long ago as 1879 when Moss prepared "Gynocardic acid," which eventually, in the form of "Sodium gynocardate," really a chaulmoogra oil soap, soluble in water, became a commercial article. This name, which still crops up in chemical and medical literature, is an unfortunate reminder of the mistaken view that chaulmoogra oil is derived from *Gynocardia odorata*. Power and his co-workers also prepared water-soluble salts of their pure chaulmoogric and hydnocarpic acids, and, what is more interesting in view of recent developments, methyl and ethyl esters of these acids. Clinical trials were made about that time with some of these products but the results were not striking enough to warrant their introduction into medicine, probably because the trials were not carried on for the long period now known to be necessary to ensure success. The first real advance\* on the medical side was made by Sir Leonard Rogers, who began work in India about 1915 (Lancet, Feb. 5, 1916; Indian Journal of Medical Research, 1917, vol. 5, p. 277). He used at first sodium salts of the total fatty acids of both chaulmoogra and hydnocarpus (*H. Wightiana*) oils but eventually got the best results with sodium salts of fractions of the fatty acids rich

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\* During the last 20 years research on these oils, especially on the bacteriological and medical sides, has been particularly active, and in this note only the results which are of special importance can be referred to. Several of the publications quoted contain selected bibliographies, which will be useful to those who desire fuller information.



in hydnocarpic acid. The latter acid melts at 60° C. and Rogers's best fractions had melting points 57–58° C. and 60–62° C., whereas chaulmoogric acid melts at 68.5° C.

Somewhat later, at the suggestion of the Director of Leprosy Investigation in the Philippine Islands, Professor Dean prepared the ethyl esters of the mixed fatty acids of chaulmoogra oil, i.e., the mixed ethyl esters of chaulmoogric and hydnocarpic acids. With this material, clinical work has been carried on with great success during the last six years (Hollman and Dean, *Journ. Cutaneous Diseases*, vol. 37, No. 6; McDonald, *Journ. Amer. Med. Assoc.*, 1920, vol. 75, p. 1483, vol. 76, p. 1121; 1921, vol. 78, p. 1470) in the Philippines and elsewhere. In India Muir has used the ethyl esters of *Hydnocarpus Wightiana* oil with equal success, though not perhaps on the large scale that has been possible in the Philippines. Similarly esters made from *H. anthelmintica* oil have been used in Siam and China.

Commenting on the results of all this work, Rogers and Muir (*Leprosy*: John Wright and Sons, Bristol, 1925, p. 288) say:—“The improved methods of dealing with leprosy have therefore placed in our hands a simple and effective means of diminishing the disease by providing treatment, under attractive conditions, for early, little or non-infective cases in out patient dispensaries, and more advanced infective types in sanatoria and colonies, only funds and organization being required to bring about a great decrease of the disease in all countries where these advantages can be supplied to a large proportion of the lepers.”

The value of chaulmoogra and hydnocarpus oils or of their derivatives having thus been demonstrated, enquiries have naturally been made as to the possibility of using other oils in which acids of the chaulmoogric series have been found. In 1923 Mr. M. T. Dawe, Commissioner of Lands and Forests, Sierra Leone, kindly provided me with a supply of Gorli seed, which as stated above had been shown in 1913 by Goulding and Akers at the Imperial Institute to contain over 45 per cent. of oil, rich in chaulmoogric acid.

The oil was extracted from Mr. Dawe's material in these laboratories and the esters of the total fatty acids prepared. The Director of Leprosy Investigations in the Philippines tried these esters in cases of leprosy but found them unsuitable as a substitute for chaulmoogra esters. This result is surprising in view of the fact that the only difference between Gorli and chaulmoogra esters is that hydnocarpic acid is absent from the former. Both sets of esters contain chaulmoogric acid and the latter acid is so like hydnocarpic acid in constitution that it ought to have the same therapeutic action. As this matter is of considerable theoretical interest and practical importance it is being further investigated, but until this and other similar questions are settled by experimental work it would seem to be advisable to confine attention to the oils from the three species already known to yield satisfactory

products containing both acids, viz., *Taraktogenos Kurzii*, *Hydnocarpus Wightiana* and *H. anthelmintica*.

An interesting side-issue in this connection is a proposal to treat leprous patients by giving them *Taraktogenos* or *Hydnocarpus* seeds to eat. So long as this is done under medical supervision there is probably nothing to be said against it, but the process is so simple that it may appeal to the benevolent layman as a means of assisting sufferers from this disease. It is well to bear in mind therefore that the seeds of all these species so far examined have been found to contain cyanogenetic glucosides, which liberate small quantities of prussic acid when the seeds are ground up in a moist condition, and that the oils they contain are toxic. It is on record, for example, that a *Hydnocarpus* oil imported into Hamburg in 1911 and used for the manufacture of edible products gave rise to poisoning cases.

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All the species referred to above belong to the Natural Family *Flacourtiaceae* and, with the exception of *Oncoba echinata* Oliv. (*Caloncoba echinata* Gilg.) which occurs in Western Tropical Africa, they are trees distributed through the tropical evergreen forests of the East Indies, up to altitudes of 4,000 ft. Our field knowledge of these trees and other allied species we owe chiefly to Dr. J. F. Rock who, in 1919, carried out a survey of the localities in which these trees were reported to grow, and whose observations are recorded in the U.S. Dep. Agric. Bull. No. 1057 of the 24th April, 1922.

Dr. Rock states that so far as he could ascertain the dealers in chaulmoogra oil have never seen the trees in their wild state. Even the native Bengal dealers whom he met in Chittagong had not been in the forests of the Chittagong Hill tracts. They all depend for their supplies on the seeds collected by the jungle people who know them by different native names in different localities. The Burmese name "Kalaw" is applied to more than one species, and as the different species closely resemble each other they are sent to the markets and bazaars under the collective name of Kalaw, where they are bought by the dealers.

So far as Dr. Rock's observations extended these trees do not appear to bear a regular yearly crop but fruit sporadically and sometimes do not bear fruit at all for two years or more. The exact reason of this he was not able to give; he notes, however, that the trees are polygamous and are undoubtedly insect-pollinated.

It does not appear that a sufficient and constant supply of seeds of known identification will ever be able to be obtained from trees in the wild state, and plantations will be necessary if a constant supply of authentic material should be required. The remoteness from any civilised centres of the forests where these trees occur, the dangers from animals and the difficulties encountered in collecting the seeds all emphasise this point.

The following notes on the climate and natural conditions in which *Taraktogenos* occurs are given by Dr. Rock as a guide to prospective planters of these trees. The soil should be of a sandy nature, preferably quartz sand. Perfect drainage is necessary, and undulating or hilly land is preferable. The region should have a distinct rainy season with a pronounced dry season in the winter months, but still with considerable humidity. The winter temperature should not fall below 40° F. *Hydnocarpus* requires slightly different conditions, but all species require well-drained sandy or loamy silt soils and grow best along creek beds or on the banks of streams; all require climates of the tropical evergreen rain forest.

On arrival at the factory the seeds are carefully washed, sun-dried for a day or two, shelled and sorted by hand, and crushed between corrugated rollers. They are then placed to a thickness of about an inch in jute bags about a foot square. Five layers of eight of these bags are pressed at one time. A steel plate is placed above each layer and the whole subjected to hydraulic pressure. The cold drawn oil is collected in tin cans and filtered through ordinary blotting paper. The residual cake, which is still rich in oil and contains about 6 per cent. nitrogenous compounds, is used as a manure on tea plantations and paddy fields.

In the present contribution Dr. Henry draws particular attention to three of the species hitherto under observation, namely, *Taraktogenos Kurzii* King, *Hydnocarpus Wightiana* Blume, and *H. anthelmintica* Pierre. These species come from quite distinct areas, but all are trees occurring in tropical evergreen forests.

The genus *Taraktogenos* occurs in Assam, Burma, Indo-China, Malay and the Dutch East Indies; twelve species are so far known. It seems possible that there is more than one species known under the name of *T. Kurzii* King, and in the following notes the references to the Burmese and Assam plants have been kept separate. The herbarium material, especially that of flowering specimens, is very scanty and the investigation cannot be carried further until additional material has been obtained. The Burmese tree, locally known as "Kalaw," is distributed throughout Burma though Rock states it is confined to localities of no great elevation. It occurs in dense tropical humid forests with lower strata of fern and shrubs and generally grows in the quartz sand in the beds and along the banks of streams, and on loamy flat country subject to inundation during the rainy season. It grows to a height of 40 or 50 ft. developing a strong and vigorous taproot and has a straight trunk and smooth, pale, yellowish-brown bark. The branches are at first at right angles to the trunk but are very flexible and soon droop downwards especially under the weight of the fruits which are borne on the ends of the branches. The general appearance of the tree is pyramidal, not unlike an old fir tree. The fruits are round, not pointed at the apex, of a light fawn colour, minutely granular, velvety-tomentose, and are about the size of a large orange. The



seeds, which are numerous, are irregularly oval and are embedded in pulp. The fruit matures during the rainy season and then falls to the ground, when it is eagerly sought after by bears and monkeys on account of the fruit flesh.

The Assam plant, locally known as "lemtam," occurs at elevations up to 4,000 ft. in the northern half of Assam. It also is to be found in heavy loamy soil on land subject to inundation and often swampy. More often than the Burmese trees it occurs scattered and frequently in company with *Gynocardia odorata*. Its fruit is ridged especially towards the apex and is darker than the fruits of the trees growing in Burma.

In this connection an interesting communication has been received from Mr. Joseph Jones, who states that in December, 1920, he received at the Botanic Gardens, Dominica, two consignments of seeds through the Royal Botanic Garden, Calcutta. One lot appeared to have come from Assam and one from Burma. From these seeds trees of two growth forms have resulted. Those considered to have come from Burma have produced trees with pendulous branches resembling a fir and with light green leaves (Plate III) whilst the Assam seeds have produced trees of compact growth with ascending branches, shorter internodes and dark green leaves (Plate IV). These Dominica specimens have not yet flowered but Mr. Jones, through whose courtesy the illustrations have been supplied, considers they may come into bearing when about 8 years old.

Prof. Craib, in his enumeration of the Siamese *Flacourtiaceae*\*, merges the genus *Taraktogenos* into *Hydnocarpus* and the species under consideration becomes *H. Kurzii* Warbg. At the same time he recognises a new variety *H. Kurzii* var. *conica* which is distinguished by its oval fruit with a conical apex; the vegetative characters of the herbarium specimens resemble each other closely; the flowers of this variety have not been seen. Although the variety is recorded from Siam Prof. Craib considers that it is likely to occur in Burma as well as the species and that both are included among the specimens cited by King.

It is not possible in the present state of our knowledge to say whether the differences noted by Rock, Jones and Craib concern the same plants, but there appears to be more than one species, variety, or possibly physiological race under the name *Kurzii*.

The genus *Hydnocarpus*, to which the other two species specially mentioned by Dr. Henry belong, is distributed through India, Ceylon, the Andamans, Malay, Indo-China and the Dutch East Indies to the Philippines and New Guinea; thirty-two species have so far been described.

*Hydnocarpus Wightiana* Bl. occurs in tropical evergreen forests of South-Western India along the western Ghats, from North Kanara to Travancore, and is found up to an altitude of 3,000 ft. and attains a height of from 50 to 100 ft. Its trunk is rather slender, sometimes

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\* *Florae Siamensis Enumeratio*, Part I, 1925, p. 97.

PLATE III.



PLATE IV.





fluted, and the bark is pale brown and somewhat rough. Its white flowers appear in March and April and the fruits from about October to December. The latter are from 2 to 4 inches in diameter, slightly angular, and tomentose; the seeds are numerous, obtusely angular and embedded in pulp. Like *Taraktogenos Kurzii* and the following species it is generally to be found growing near water.

*Hydnocarpus anthelmintica* Pierre, known in Siam as "maik-rabao" or "lukrabao," and to the Chinese as "Ta-fung-tze," occurs in Siam and Indo-China up to elevations of 1,000 ft. and is in cultivation at Chiangmai and elsewhere in Siam. It attains a height of 60 ft.; the male flowers appear from January to March, earlier in the year than the female, and perhaps more frequently. The fruits are globose, about three inches in diameter and contain from 30 to 40 seeds. It is generally to be found on the banks of rivers and estuaries where the water table is high.

Although some thousands of plants of these various species have been raised from the seed distributed by Dr. Rock to Honolulu, Washington, the Philippines and Singapore, there are no plantations in bearing from which a reliable supply of seed can be obtained. The only source from which seed can be obtained at present is from native collectors and the origin of such seed is uncertain, but when the trees that have been established in various tropical countries come into bearing in the course of a few years it will be possible to obtain seed of known identity.

The seed quickly loses its vitality and requires to be carefully packed for transmission. The best results so far have been obtained with seed packed in moist powdered charcoal in cotton bags which were wrapped securely in strong oil paper and then in heavy manila paper.

Very little is known at present of this group of plants, which promise to prove of economic importance. Further investigation in the field, additional material for herbarium study and experimental work on plantations are required before their proper value can be appreciated.

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#### IV.—HUMBOLDT AND BONPLAND'S ITINERARY IN COLOMBIA.\* T. A. SPRAGUE.

Towards the end of November, 1800, Humboldt and Bonpland left Venezuela for Cuba, where they remained for nearly three months (December 19th–March 15th). After a protracted voyage from Batabano on the south coast of Cuba in a small sailing vessel they finally anchored on March 24th, 1801, off the mouth of the Rio Sinú, on the north coast of Colombia. There they spent two days in botanizing along the banks of the river, finding a wonderful

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\* For their Itineraries in Mexico and Venezuela see *Kew Bull.* 1924, pp. 20–27; 1925, pp. 295–310.

wealth of palms and many new plants belonging to other families. On March 27th they proceeded to Cartagena, arriving on March 30th after a violent storm, and a narrow escape on shore from some escaped negro slaves (Cimarrones), who rushed out from the neighbouring thickets in the hope of seizing the ship's boat. Three weeks were spent very profitably at Cartagena, and a visit was paid to the curious mud volcanos of Turbaco, described in the fifth chapter of Humboldt's *Views of the Cordilleras*.

On April 19th, 1801, the travellers left Turbaco for Barrancas Nuevas, where they embarked on April 21st for their 55 days' voyage up the Magdalena River, reaching Honda on June 13th. After a short visit to the mountains of Mariquita in the Central Cordillera, Humboldt and Bonpland returned to Honda and proceeded via Guaduas to Bogotá, where they stayed for three months (July 6th–September 8th). The celebrated waterfall of Tequendama was among the numerous places of interest seen. This and the natural bridge of Icononzo (near Pandi) are graphically described in Humboldt's *Views of the Cordilleras*, chapters vi. and vii., and in Édouard André's "*L'Amerique Équinoxiale*" published in *Le Tour du Monde* (1877–1883).

The next stage of the journey was from Bogotá via Fusagasugá and Pandi to Melgar and Espinal in the Magdalena valley, and thence through Ibagué and over the Quindió pass to Cartago, a town of some importance situated in the valley of the river Cauca. At the time of Humboldt and Bonpland's journey the track over the Quindí pass was extremely bad, and the two travellers had to walk the whole way from Ibagué to Cartago, followed by a dozen oxen bearing their instruments, collections and personal luggage. It was much improved, however, about the middle of the nineteenth century, and can now be traversed on mule-back. Perhaps the best known tree of the Quindió mountains, the majestic Wax Palm (*Ceroxylon andicola*), at the time of André's visit (1876) was unfortunately being felled in thousands. Tree ferns, gorgeous passion flowers, Fuchsias, and delicately tinted orchids grew in profusion beneath the ivory-white columns of the palms, lending a rare enchantment to the scene.

Cartago was reached in the beginning of October, 1801, and the route then led southwards along the Cauca valley to Popayan, which enjoys perhaps the most delightful climate of any town in Colombia. The month of November was spent at Popayan, whence excursions were made to the basaltic mountains of Julusuito and the volcano of Puracé. In order to avoid the torrid and fever-stricken valley of the river Patía, the travellers now followed the mountain-route to Pasto via Almaguer. The rainy season had commenced, however, and the passage through a country composed of alternating stretches of dense forest and treacherous morass, and over the icy páramo region which lies above the limit of trees, was full of hardships. Christmas was spent at Pasto, and the travellers then rapidly proceeded on their way to Quito, passing successively the

towns of Túquerres and Ypiales, the celebrated natural bridge of Rumichaca, one end of which is in Colombia and the other in Ecuador, and the towns of Tulcan and Ibarra. Tulcan, which is included in Humboldt's list of localities in the Andes of Pasto, New Granada, is now in Ecuador. Quito was reached on January 6, 1802. The remainder of Humboldt and Bonpland's journey in South America, including their travels in Ecuador and Peru, will be dealt with in a subsequent paper.

The principal sources of information regarding Humboldt and Bonpland's travels in Colombia are enumerated below.

1. Bruhns, K., Alexander von Humboldt, eine wissenschaftliche Biographie (Leipzig, 1872).  
Vol. i., chapters iv. and v., pp. 345-360 (travels in Colombia); Beilagen, pp. 464-466 (chronology of journey in tropical America).
2. Klencke, H., Alexander von Humboldt's Leben und Wirken, Reisen und Wissen, ed. 7 (Leipzig & Berlin, 1882).  
Pp. 156-165 (travels in Colombia).
3. Humboldt, A., Atlas Géographique et Physique du Nouveau Continent (1814-1834).
4. Humboldt, A., Atlas Pittoresque (1810).  
Pp. 9-13, t. 4 (Ponts naturels d'Icononzo); pp. 13-19, t. 5 (Passage du Quindiu); pp. 19-23, t. 6 (Chute du Tequendama); pp. 220-221, t. 30 (Cascade du Rio Vinagre); pp. 239-241, t. 42 (Volcans d'air de Turbaco).
5. Humboldt, Bonpland et Kunth, Nova Genera et Species Plantarum (Paris, 1816-25).  
Vol. vii. pp. 335-338 (classified list of localities in New Granada); pp. 338-376 (enumeration of plants collected in New Granada, with their localities).
6. Humboldt, A., Views of the Cordilleras (various editions).  
Chapters v. (mud volcanos of Turbaco), vi. (waterfall of Tequendama), vii. (natural bridge of Icononzo), viii. (Quindió Pass), ix. (Rio Vinagre near the volcano of Puracé).
7. André, Édouard, "L'Amérique Équinoxiale" in Charton, *Le Tour du Monde* (Paris), 1877, xxxiv. 1-64; 1878, xxxv. 129-224; 1879, xxxvii. 97-144; 1879, xxxviii. 273-368; 1883, xlv. 337-416 (numerous illustrations and maps).
8. Esguerra O., Joaquin, Diccionario Jeográfico de los Estados Unidos de Colombia (Bogotá, 1879).

In the following Itinerary the localities have been arranged as far as possible in the order in which they were visited by Humboldt and Bonpland, with the following exceptions: Melgar and Espinal are included at the end of the other localities in the Magdalena valley, although they were visited three months later; and the mountains of Mariquita, visited in June, 1801, are placed with the



other places in the Central Cordilleras through which Humboldt and Bonpland passed in September, 1801, after a three months stay in the neighbourhood of Bogotá. Most of the localities may be found on one or more of the maps cited under each section, and the approximate geographical position of the remainder may be ascertained by means of the numerical sequence. Names of places which may be found in a good atlas are printed in black type.

#### ITINERARY.

Rio Sinú, Cartagena and Rio Magdalena, March-June, and September, 1801.

(*vide* H.B.K. Nov. Gen. vii. 335; Humb. et Bonpl., Voyage, Atlas Géogr., sér. 1, t. 24; André in Le Tour du Monde, 1877, xxxiv. 35, map; 1878, xxxv. 221, map).

1 **Rio Sinú**; 2 El Zapote; 3 Santero; 4 Cerro de San Nicolas; 5 **Santiago** de Tolú; 6 Isla de Barú; 7 **Cartagena**; 8 Cerro de la Popa; 9 Turbaco; 10 Mahates; 11 El Dique de Mahates; 12 Barrancas Nuevas; 13 **Tenerife**; 14 Zambrano; 15 Pinto; 16 **Mompox** (Mompox); 17 Minchiqueo (Menchiquejo); 18 Peñones de Roso; 19 Banco; 20 El Peñon; 21 Tamalameque; 22 El Regidor; 23 Rio Viejo; 24 Morales; 25 Badillas; 26 Cerros de San Lucar; 27 Paturia; 28 La Simitarra; 29 Los Pajarales de Sogamozo; 30 Boca del **Rio Sogamozo**; 31 Bojorque; 32 Barrancas Vermejas; 33 Boca del **Rio Opon**; 34 Caño de Chucuri; 35 Isla de Brujas; 36 Caño de Juancito; 37 Peñon de Barbacoa; 38 Caño de Regla; 39 San Bartolomé; 40 Garrapatas; 41 Peñon de Macuango; 42 Quebrada del Ermitaño; 43 Angostura de Carare; 44 Nares; 45 Brazo de Velasquez; 46 Rio de La Miel; 47 Buenavista; 48 La Egyptiaca; 49 Guarumo; 50 **Honda**; [**Ambalema**: not visited] 51 Melgar, and 52 El Espinal (Sept. 1801).

Eastern Cordilleras: from Honda to Bogotá and neighbourhood, and thence via Pandi to Melgar, June-Sept. 1801.

(*vide* H.B.K. Nov. Gen. vii. 336; Humb. et Bonpl., Voyage, Atlas Géogr. sér. 1, tt. 6, 19, 24; André in Le Tour du Monde, 1877, xxxiv. 53, map; Petermanns Mittheil. 1888, t. 7; Ergänzungsh. No. 104, t. 1).

53 **Honda**; 54 Las Cruces; 55 Salto del Fraile; 56 Alto del Sargento; 57 Guaduas; 58 Cune; 59 Villeta; 60 Mave; 61 El Guaya-val; 62 Alto de Gascas; 63 El Aserradero; 64 Alto del Roble; 65 **Facatativá**; 66 Fontibon; 67 Santa Fé de **Bogotá**; 68 Guadalupe; 69 Monserrate; 70 Páramo de Chingasa; 71 Suba; 72 Cota; 73 Tenjo; 74 Chia; 75 **Zipaquirá**; 76 Soacha (Suacha); 77 Chipo; 78 Salto de Tequendama; 79 Páramo de San Fortunato; 80 Fusagasugá; 81 Pandi (Mercadillo); 82 Puente de Icononzo; 83 Quelamana; 84 Picala; 85 Melgar.

Central Cordilleras; Honda to Mariquita and Santa Ana, June 1801; Espinal to Cartago, via Ibagué and the Quindió Pass, Sept. 1801.

(*vide* H.B.K. Nov. Gen. vii. 336; Humb. et Bonpl., Voyage, 26

Atlas Géogr. sér. 1, t. 24; André in Le Tour du Monde, 1878, xxxv. 221, map; 1879, xxxvii. 99, map; Petermanns Mittheil. 1883, t. 13).

86 Rio Guali; 87 Mariquita; 88 Rio Quama; 89 Santa Ana; 90 Espinal; 91 Rio Luisa; 92 Mesa de Cuello; 93 Contreras; 94 Valle de Combeima; 95 **Ibagué**; 96 Valle de Caravajal; 97 Cuesta de Tolima; 98 La Palmilla; 99 El Moral; 100 El Azufra; 101 Paso de Machin; 102 Quebrada de Toche; 103 Las Cruces; 104 Los Gallegos; 105 Quebrada de Tohecito; 106 La Ceja (La Seja); 107 Los Volcancitos; 108 El Boqueron del Páramo (de **Quindió**); 109 La Garita del Páramo (de **Quindió**). 110 El Inciense; 111 Quebrada de Boquia; 112 Portachuelo; 113 **Cartago**.

Cauca Valley and Cordillera of Popáyan; from Cartago to Popáyan, Oct. 1801.

(*vide* H.B.K. Nov. Gen. vii. 337; Humb. et Bonpl., Voyage, Atlas Géogr. sér. 1, tt. 24, 25; André in Le Tour du Monde, 1879, xxxvii. 99, 135, maps; xxxviii. 275, map).

113 **Cartago**; 114 El Naranjo; 115 Roldanillo; 116 Tulua; 117 San Pedro; 118 **Buga**; 119 Alegría; 120 **Calí**; 121 Caloto; 122 Quilichao; 123 Rio Pescador; 124 Rio Pindamon; 125 Rio de Palacé; 126 **Popayan**.

Cordilleras of Popayan and Almaguer, Oct.-Nov. 1801.

(*vide* H.B.K. Nov. Gen. vii. 337; Humb. et Bonpl., Voyage, Atlas Géogr. sér. 1, t. 24, inset; André in Le Tour du Monde, 1879, xxxviii. 275, 301, maps).

126 **Popayan**; 127 Cerro de la Emme; 128 Coconuco; 129 Boquita del Volcan de Puracé; 130 Rio Vinagre; 131 PISOJÉ; 132 Poblazon; 133 Alto del Roble; 134 Timbio; 135 Quilcasé (Quilquasé); 136 La Sequia; 137 Rio Esmita (Smita); 138 Rio Blanco; 139 Valle del Rio Guachicon; 140 Valle del Rio Putes; 141 San Miguel; 142 La Ascension; 143 Páramo de Socoboni; 144 Rio Pansitara; 145 Vega de San Lorenzo; 146 Páramo de Cuyurcu; 147 Paramito de Almaguer; 148 Rio Marmato; 149 Puntaurcu; 150 **Almaguer**; 151 Páramo de las Papas; 152 Valle del Rio Ruiz; 153 Páramo de Pitatumba; 154 Pongo; 155 Valle del Rio Xayo (Jayo); 156 Valle de Sambingo; 157 Páramo de Achupallas.

Cordillera of Pasto, Nov.-Dec. 1801.

(*vide* H.B.K. Nov. Gen. vii. 337; Humb. et Bonpl. Voyage, Atlas Géogr. sér. 1, tt. 5, 22; André in Le Tour du Monde, 1879, xxxviii. 301, 354, maps; 1883, xlv. 339, map).

158 Mamendoy; 159 Rio Mayo; 160 San Pablo; 161 La Cruz; 162 Los Volcancitos del Páramo de Puruguay; 163 Aguacillas; 164 Hacienda de la Erre; 165 Páramo de Aponte; 166 Sebondoy; 167 Sacandanoy; 168 Valle de Yanacatu; 169 El Tablon; 170 Rio Juanambu; 171 Voisaco (Buesaco); 172 Meneses; 173 Alto de Aranda; 174 **Pasto**; 175 Yacanquer; 176 Teindala; 177 Valle del Rio Guaitara; 178 Quarchú; 179 Valle del Rio Sapuyes; 180 Chilanquer; 181 **Túquerres**; 182 Volcan de Azufra; 183 Volcan de

Cumbal; 184 Volcan de Chiles; 185 Guachucal; 186 Ypiales (Ipiales); 187 Rio Blanco; 188 Puente de Rumichaca.

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## V.—ADDITIONS TO THE INDEX KEWENSIS : VII.\*

Pierre's Flore Forestière de la Cochinchine was published in 26 fascicles, fascicles 1-25 containing 400 plates with text, and fascicle 26 containing the table of contents, 14 pages, the whole work covering the period 1879-1907. Professor W. G. Craib having drawn the attention of Kew to a few names published in this work and not included in the Index Kewensis, it was considered advisable to go through the whole work with a view to detecting any further omissions. As a result it has been found that 98 names have either been omitted altogether or erroneously entered, 70 of them being from the period covered by the first supplement of the Index Kewensis.

Names not appearing on the plates but mentioned in the text are quoted "sub t." Those published as synonyms are marked "in syn." New combinations are followed by the binary name on which they are based.

M. L. G.

### PIERRE, FLORE FORESTIÈRE DE LA COCHINCHINE (1879-1907).

- Amerimnon aestivale sub t. 381 (1898) : *Dalbergia aestivalis*.  
" anomalum sub t. 381 (1898) : *Dalbergia anomala*,  
" bariense sub t. 380 (1898) : *Dalbergia bariensis*.  
" cambodianum sub t. 383 (1898) : *Dalbergia cambodiana*.  
" cochinchinense sub t. 382 (1898) : *Dalbergia cochinchinensis*.

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\* Continued from *Kew Bull*, 1925, 345.

- Amerimnon dongnaiense sub t. 382 (1898) : *Dalbergia dongnaiensis*.  
 „ Duperreanum t. 381 (1898) : *Dalbergia Duperreana*.  
 „ fuscum sub t. 381 (1898) : *Dalbergia fusca*.  
 „ mammosum sub t. 380 (1898) : *Dalbergia mammosa*.  
 „ saigonense sub t. 381 (1898) : *Dalbergia saigonensis*.  
 Ancistrolobus prunifolius *Hort. ex Pierre* sub t. 52 (1882) : *Cratoxylon prunifolium*.  
 Anisoptera scaphula sub t. 235 (1890) : *Vatica scaphula*.  
 Aphanamixis cochinchinensis t. 343 (1896).—Cochinch.  
 „ rohituka t. 344 (1896) : *Amoora rohituka*.  
 Aquilaria crasna sub t. 385 (1899), nomen.—Cochinch. ; Cambodia.  
 Bombax anceps t. 175 (1888).—Cochinch.  
 „ cambodiense t. 174 (1888).—Cambodia.  
 Buchaniana t. 370 (1898), sphalm. : *Buchanania Spreng.* (Anacardiaceae).  
 Cnemidiscus Thorelii sub t. 320 (1894).—Cochinch.  
 Columbia angusta sub t. 137 (1888).—Cambodia.  
 Decaschistia affinis t. 171 (1888).—Cambodia.  
 „ Harmandii t. 170 (1888).—Anam.  
 „ Thorelii t. 170 (1888).—Cochinch. ; Cambodia.  
 Dipterocarpus condorensis t. 214 (1889).—Cochinch.  
 Elaeocarpus gratissimus *Blume ex Pierre* sub t. 144 (1888), nomen.—Hab. ?  
 „ leptophanes *Blume ex Pierre* sub t. 144 (1888), nomen.—Hab. ?  
 „ polysticus *Blume ex Pierre* sub t. 144 (1888), nomen.—Hab. ?  
 Epicharis procera sub t. 348 (1896) : *Dysoxylum procerum*.  
 „ ramiflora sub t. 348 (1896) : *Dysoxylum ramiflorum*.  
 Eriolaena affinis t. 176 (1888).—Cambodia.  
 Erythroxylon cambodianum t. 282 (1893).—Cochinch. ; Cambodia.  
 Euonymus calyptratus t. 311 (1894), in syn. : *Glyptopetalum calyptratum*.  
 „ chaudocensis t. 310 (1894), in syn. : *Glyptopetalum chaudocense*.  
 „ cochinchinensis t. 309 (1894).—Cochinch.  
 „ gracilipes t. 311 (1894), in syn. : *Glyptopetalum gracilipes*.  
 „ Harmandianum t. 310 (1894), in syn. : *Glyptopetalum Harmandianum*.  
 „ mitratus sub t. 308 (1894).—Cambodia.  
 „ stixifolius t. 310 (1894), in syn. : *Glyptopetalum stixifolium*.  
 Euphorbia pallens t. 318 (1894).—Cochinch.  
 Eurycoma cochinchinensis sub t. 292 (1893), in syn. : *E. longifolia* var. *cochinchinensis Pierre*.  
 „ Harmandiana t. 292 (1893).—Cochinch.  
 Evodia ailantifolia t. 287 (1893).—Cochinch.  
 „ trichotoma t. 287 (1893) : *Tetradium trichotomum*.  
 Fegimanra sub t. 263 (1892), gen. nov. (Anacardiaceae).  
 „ africana sub t. 263 (1892) : *Mangifera africana*.  
 Galedupa maritima sub t. 385 (1899) : *Sindora maritima*.  
 „ mucronata sub t. 385 (1899) : *Sindora mucronata*.  
 Garcinia Vriesiana fasc. 4, p. xxxvi (1882).—Celebes.  
 Glyptopetalum calyptratum sub t. 311 (1894).—Cochinch.  
 „ chaudocense sub t. 310 (1894).—Cochinch.  
 „ gracilipes sub t. 311 (1894).—Penins. Mal.  
 „ Harmandianum sub t. 310 (1894).—Indo-China (Laos).  
 „ stixifolium sub t. 310 (1894).—Indo-China (Laos).  
 Glycosmis cambodiana sub t. 285 (1893).—Cochinch.  
 „ Harmandiana sub t. 285 (1893).—Cochinch.  
 „ ovoidea sub t. 285 (1893).—Cochinch.  
 Grewia brevipes sub t. 153 (1888), nomen.—Hab. ?  
 „ Roxburghiana *Korth. ex Pierre* sub t. 153 (1888), nomen.—Hab. ?  
 Hippocratea Chesseana t. 301 (1893).—Cochinch.  
 Hiptage mekongensis t. 270 (1892).—Indo-China (Laos).  
 „ triacantha t. 274 (1893).—Cochinch. ; Cambodia.  
 Ilex excavata t. 279 (1893).—Cochinch.

- Koelreuteria arborescens* sub t. 322 (1895) : *Arfeuillea arborescens*.  
*Lepiaglaia* t. 334 (1895), gen. nov. (Meliac.).  
 „ *Bailloni* t. 352 (1896).—Cambodia.  
 „ *Montrouzieri* sub t. 340 (1896).—Indo-China.  
 „ *pyramidata* sub t. 334 (1895).—Cochinch. ; Cambodia.  
 „ *tetrapetala* sub t. 337 (1896).—Cochinch. ; Cambodia.  
*Locandia mekongensis* sub t. 262 (1892).—Cochinch.  
*Luvunga nitida* t. 288 (1893).—Cambodia.  
*Mangifera Rumphii* sub t. 364 (1897).—Ins. Molucc.  
*Nephelium Thorelii* t. 320 (1894), in syn. : *Cnemidiscus Thorelii*.  
*Pedicellia pentapetala* sub t. 324 (1895) : *Cupania pentapetala*.  
*Peltophorum rufum* sub t. 388 (1899) : *Baryxylum rufum*.  
*Pongamia pinnata* sub t. 385 (1899) : *Caju pinnatum*.  
*Pragmatropa* sub t. 309 (1894), gen. nov. (Celastrac.).  
 „ *pendula* sub t. 309 (1894) : *Euonymus pendulus*.  
*Pragmotessara* t. 309 (1894), gen. nov. (Celastrac.).  
 „ *echinata* sub t. 309 (1894) : *Euonymus echinatus*.  
 „ *ilicifolia* sub t. 309 (1894) : *Euonymus ilicifolius*.  
 „ *japonica* t. 309 (1894) : *Euonymus japonicus*.  
 „ *latifolia* sub t. 309 (1894) : *Euonymus latifolius*.  
 „ *theifolia* sub t. 309 (1894) : *Euonymus theifolius*.  
*Pterocymbium campanulatum* t. 195 (1889) : *Sterculia campanulata*.  
 „ *columnare* t. 195 (1889).—Cochinch.  
 „ *dongnaiense* sub t. 195 (1889) : *Sterculia dongnaiensis*.  
 „ *tubulatum* sub t. 195 (1889) : *Sterculia tubulosa*.  
*Salacia kamputensis* t. 312 (1894).—Cambodia.  
*Sapindus anamensis* t. 317 (1894), in syn. : *Pavieasia anamensis*.  
*Shorea attopoënsis* t. 232, 257 (1890-92).—Indo-China (Laos).  
 „ *saigonensis* t. 257 (1892).—Cochinch.  
 „ *tomentosa Hort. Bogor. ex Pierre* sub t. 225 (1890), in syn. : *Pentacme siamensis* var. *suavis Pierre*.  
*Unona evecta* t. 31 (1880).—Indo-China.  
 „ *suberosa* sub t. 31 (1880), nomen.—Hab. ?  
*Ventilago fascigera* t. 314 (1894).—Cambodia.  
*Xerospermum Thorelii* t. 320 (1894), in syn. : *Cnemidiscus Thorelii*.  
*Zizyphus Harmandii* t. 316 (1894), sphalm. : *Z. rugosa* var. *Harmandii Pierre*.  
 „ *hoaënsis* t. 315 (1894).—Cochinch.

## VI.—LINDEN AND PLANCHON'S PLANTAE COLUMBIANAE. T. A. SPRAGUE.

An account of the Botany of J. Linden's third expedition to tropical America, by J. Linden and J. E. Planchon, was printed in 1863\*. According to Urban† the work was never publicly issued, but about the years 1874-75 Prof. A. Cogniaux, with J. Linden's permission, had five copies put together from the clean sheets, one for J. Linden, a second for the Botanic Garden, Brussels, and the remaining three for E. Marchal (Brussels),

\* Troisième Voyage de J. Linden, dans les parties intertropicales de l'Amérique, au Venezuela, dans la Nouvelle-Grenade, à la Jamaïque et dans l'île de Cuba, exécuté par ordre du Gouvernement Belge pendant les années 1841 à 1845, et publié sous ses auspices.—Première partie. Botanique. *Plantae Columbianaë*, par J. Linden et J. E. Planchon. Tome 1er. (Bruxelles, 1863.)

† Symb. Antill. iii. 78, footnote (1902).



E. Fournier (Paris), and I. Urban (Berlin) respectively. J. E. Planchon probably possessed only proof-sheets. Urban considered that the new species described in this work were effectively published. The view might be taken, however, that the distribution of five copies, one to a Botanic Garden, and the remaining four to individual botanists, does not constitute "public distribution" under Art. 35 of the International Rules.

The work is not mentioned in Pritzel's Thesaurus, ed. 2 (1872), but is included in the Catalogue of the Library of the Arnold Arboretum, vol. i. p. 429 (1914). A copy, formerly in the possession of the late Édouard André, was acquired by Kew in 1921. In view of the very great rarity of the volume, and the large number of new species described in it, the following account may be of interest.

The Introduction includes a sketch of the Physical Geography and Climatology of Colombia and Venezuela (pp. i-xxxvi), and a historical summary of the Botanical Exploration of those countries (pp. xxxvii-lxiv). It is followed by an appendix on the distribution of the seasons in the different provinces of Venezuela (pp. lxv-lxviii) and a series of tables dealing with the provinces and cantons of Venezuela and Colombia, and the altitudes, average temperatures and geographical positions of the principal localities and mountains (pp. lxix-lxxxviii).

The remainder of the volume (pp. i-64)—which ends abruptly in the middle of a sentence—is devoted to an enumeration of plants from Colombia and Venezuela, collected for the most part by Linden, Funck and Schlim. It includes descriptions of about fifty new species. Some twenty of these were published in advance by Triana and Planchon in the first three parts of their *Prodromus Florae Novae-granatensis*.\* *Monnina meridensis* Planch. et Linden was published by Weddell in his *Chloris Andina*, ii. 268 (1857-61). Gürke† took up *Malvaviscus elegans* Linden et Planch. and *M. speciosus* Linden et Planch. from the "Plantae Columbianae," and cited *M. glabrescens* and *M. Funckeanus* as synonyms of *M. oligotrichus* and *M. cuspidatus* respectively; Triana and Planchon‡ cited *Abutilon aurantiacum* Linden et Planch. as a synonym; and Urban§ reproduced the description of *Sauvagesia Brownei* Planch. The remaining twenty-five species appear to have been overlooked, both by monographers and by those concerned with the floras of Venezuela and Colombia. Ten of them do not appear to have been described under any other names, either before or since the year 1863. Two, *Arenaria humifusa* and *Cerastium meridense*, were redescribed as new species in 1911 by Briquet from the same type-numbers under the

\* Ann. Sc. Nat. sér. 4. xvii. 5-190, 319-382 (1862); xviii. 258-381 (1862).

† Mart. Fl. Bras. xii. pars. 3, 536-540 (1892).

‡ Ann. Sc. Nat. sér. 4, xvii. 182, footnote (1862).

§ Symb. Antill. v. 430 (1908).

names *Arenaria venezuelana* and *Cerastium venezuelanum* respectively.\* Ten were described as new species under different names prior to 1863, with citation of *the same type-numbers*. The remaining three, *Cissampelos pinnosa*, *Berberis nutans* and *Luehea nobilis* also appear to be synonyms of previously described species.

Unknown to Linden and Planchon, the Russian botanist, Turczaninow, had in the years 1854 and 1858 described many new species from Venezuela and Colombia, eleven of them being actually based on material bearing the same collector's numbers as species described in the "Plantae Columbianaë." When Triana and Planchon prepared the first part (published in 1862) of their "Prodromus Florae Novae-granatensis" they were aware, however, of Turczaninow's second paper, but apparently not of his first: thus they took up *Malvaviscus oligotrichus* Turcz., *Luehea endopogon* Turcz., and *Saurauja brachybotrys* Turcz. (all published in 1858), but did not account for *Berberis psilopoda* Turcz., *Viola Lindeniana* Turcz., *Securidaca dasycarpa* Turcz., etc. (published in 1854). If, as seems probable, Linden and Planchon subsequently became aware also of Turczaninow's first paper, they would have discovered that he had forestalled them in describing about thirteen of their new species, and this discovery may have induced them to withhold the "Plantae Columbianaë" from publication.

The following commentary on the "Plantae Columbianaë" includes (1) reductions of thirteen species and one variety; (2) less certain reductions of four species; and (3) reproductions of Linden and Planchon's descriptions of fifteen species which do not appear to have been described by previous authors, and of the four species mentioned under heading (2).

In reproducing Linden and Planchon's text a few minor typographical alterations have been made in order to bring it more into line with modern practice. The numerous editorial notes are distinguished by being enclosed in square brackets.

#### ANONACEAE.

**Xylopia Dunaliana** *Planch. et Linden ex Triana et Planch. Prodr.*† 37 (1862), in syn.; Linden et Planch. *Pl. Columb.* 5 (1863), descr.

Foliis breviter petiolatis anguste oblongis (12-18 cm. longis) sensim acuminatis basi obtusiusculis margine integro revolutis supra glabris nitidis subtus (junioribus praesertim) pube adpressissima rufo-sericea indutis demum subglabratissimis, cymis axillaribus abbreviatis subsessilibus 2-4-floris, pedicellis brevissimis medio bractea semicucullata obtusissima stipatis, calyce cupuliformi repando 3-dentato denum plus minus irregulariter fissis sericeo-pubescentibus, petalis exterioribus e basi ovata linearibus intus rufo-

\* Ann. Conserv. & Jard. Bot. Genève, xiii & xiv. 381, 383 (1911).

† Throughout the present paper references are given to the separately paged reprint of Triana and Planchon's Prodromus, as this is much more convenient to consult than the Annales des Sciences Naturelles, in which the Prodromus was published by instalments.

sericeis interiora pruinoso-albida superantibus, carpellis abortu 2-5 stipite eis duplo brevioris sustentis oblongis vix curvulis a lateribus compressiusculis glaberrimis superficie rugosis indehiscentibus, seminibus 6-9 uniseriatis compresso-ovoideis, testa nitida nigricante, arillo e lobis 2 discretis carnosis albidis utrinque ad basim seminis testae adnatis 3 mm. longis constante.— *Unona xylopioides* Dunal, Anon. 117, tab. 24 ; H.B.K., Nov. Gen. v. p. 62. *Xylopia grandiflora* Seem., Bot. of Herald, non A. St.-Hil. Vulgo : Fruto de Burro ; Zembi, à Mariquita ; Achon, dans les llanos de San Martin.

VENEZUELA. Montalban (prov. de Carabobo), Juin 1846, *Funck & Schlim*, no. 655.

NOUVELLE-GRENADE. Ocaña, *Schlim*.

Espèce très-voisine du *Xylopia grandiflora* A. St.-Hil. dont elle se distingue aisément à sa pubescence très-courte, bien couchée, au lieu d'être molle et veloutée. Les fruits sont aussi plus gros et plus longuement stipités.

[Included under *X. longifolia* A. DC. by Triana and Planchon l.c.]

#### MENISPERMACEAE.

**Cissampelos pannosa** *Linden et Planch.* l.c. 7.

Caulibus erectis strictis crassiusculis dense foliosis, foliis breviter petiolatis ovato-orbiculatis (non peltatis) 5-6 cm. longis basi subcordatis apice rotundato vel obtusiusculo mucronatis leviter repando-crenatis 5-7-nerviis crassis utrinque pannosis supra rufis subtus rufo-incanis, racemis foemineis axillaribus breviter pedunculatis folii dimidium circiter aequantibus, bracteis imbricatis brevissime petiolatis cordatis membranaceis incano-villosis, floribus 4-6 simul fasciculatis breviter pedicellatis, pedicellis dense ovariis parcius hispidis, stylo brevi apice tridentato, fructu obovoideo compresso circiter 6 mm. longo obtuse tuberculoso villosus.

VENEZUELA. Guanaguana, Caracas, ann. 1843, *Funck*, no. 171.

Assez semblable au *Cissampelos subtriangularis* A. St.-Hil., mais à feuilles plus tomenteuses, surtout à la face supérieure, à racèmes plus grands, etc.

[Antedated by *C. pannosa* Turcz. (1854), from Cuba. Neither of these species appears to be mentioned by Diels in Engler's Pflanzenreich, Menispermaceae, but *Funck* 171, the type-number of *C. pannosa* Linden et Planch., is cited by Diels (l.c.296) under *C. ovalifolia* var. *vestita* (Triana et Planch.) Diels.]

#### BERBERIDACEAE.

**Berberis nutans** *Linden et Planch.* l.c. 8.

Spinis 5-partitis, foliis congestis brevissime petiolatis anguste oblongis (4-6 cm. longis, 15-20 mm. latis) basi acutis apice saepius obtusis margine revolutis integris vel hinc inde exserte denticulatis coriaceis glabris supra nitidis subtus glaucis reticulato-venosis, paniculis amplis pedunculatis foliis pluribus longioribus nutantibus

multifloris, rachibus pedicellisque puberulis, floribus amplis pedicellatis glabris flavis.

VENEZUELA. Paramillo de Agua de Obispo (prov. de Truxillo), alt. 2870 m., *Linden*, no. 306 ; Sierra Nevada de Merida, alt. 3575 m., *Schlim*.

Très-belle espèce, rapprochée par l'inflorescence du *Berberis quindiuensis*. Elle s'en distingue au premier abord par ses feuilles plus petites, presque toujours entières et non bordées de nombreuses dents épineuses, glauques en dessous, etc. L'échantillon no. 306 n'est rapporté ici qu'avec doute. Il diffère du type par ses grappes simples, à peu près dressées. Mais ces grappes n'étant qu'en bouton, il se pourrait qu'elles dussent se courber pendant l'anthèse.

[The type of *B. nutans* is *Schlim*'s specimen from the Sierra Nevada de Merida. The description suggests *B. discolor* Turcz. (1854), which was based on *Funck & Schlim* 1124, from the same region.]

*Linden* 306, from Truxillo, which was cited doubtfully under *B. nutans*, has been referred to *B. truxillensis* Turcz. by Schneider in Bull. Herb. Boiss. sér. 2, v. 807.]

**Berberis tolimensis** *Planch. et Linden* ex Triana et Planch. Prodr. 52 (1862) ; *Linden et Planch.* l.c. 9.

[Founded on *Linden* 912, the type-number of *B. psilopoda* Turcz. (1854).]

**Berberis densa** *Linden et Planch.* l.c.

[Treated as a variety of *B. rigidifolia* H.B.K. by Triana and Planchon Prodr. 54, and as a variety of *B. globosa* Benth. by Schneider in Bull. Herb. Boiss. sér. 2. v. 805.]

**Berberis lycioides** *Linden et Planch.* l.c.

[Based on *Funck & Schlim* 754, the type-number of *B. truxillensis* Turcz. (1854).]

#### CRUCIFERAE.

**Cardamine pulchra** *Linden et Planch.* l.c. 12

[Founded on *Funck & Schlim* 1542, the type-number of *C. punicea* Turcz. (1854). O.E. Schulz in Engl. Jahrb. xxxii. 420 treated *C. punicea* as a variety of *C. Johnstonii* Oliv.]

**Cardamine pulchra** var. **pallida** *Linden et Planch.* l.c.

[Based on *Funck & Schlim* 1554, which is the type-number of *C. nevadensis* Turcz. (1854). O.E. Schulz, l.c. 422, treated the latter as a variety of *C. Jamesoni* Hook.]

**Cardamine lanceolaris** *Linden et Planch.* l.c.

[Based on *Linden* 1416, the type-number of *C. armoracioides* Turcz. (1854), which is maintained as an independent species by O. E. Schulz, l.c. 409.]



***Draba farsetioides* Linden et Planch. l.c. 13.**

Tota pube stellato-ramosa cinerascens, radice verticali, caule erecto simplici 20–30 cm. longo haud crasso striato lignescente, foliis infimis ad collum confertis (in specim. florido imperfectis) linearibus integris 3–6 cm. longis, caulinis remotiusculis lineari-oblongis obsolete dentatis, racemo terminali sessili 8–12 floro conferto, pedicellis flore illum *Diplotaxeos tenuifoliae* aequante vix brevioribus, sepalis oblongis obtusis viridescentibus flavo-marginatis, petalis flavis obovatis calyce paulo longioribus, filamentis subulatis ovarium superantibus, stylo gracili (7 mm. longo) glabro ovarium oblongum dense pubescentem aequante, ovulis in loculo quoque circiter 20.

VENEZUELA. Prov. de Merida : Sierra Nevada, alt. 3220 m., août 1843, *Linden*, no. 455.

***Draba Funckeana* Linden et Planch. l.c.**

Caudice simplici crasso descendente, caulibus pluribus ascendentibus e centro rosulae foliorum radicalium enatis simplicibus racemo primum conferto terminatis, foliis infimis anguste oblongis basi in petiolum marginatum latum attenuatis remote serratis uninerviis pilis simplicibus ciliatis caeterum glabriusculis, caulinis sat crebris sessilibus obsolete denticulatis, pedicellis sicut rachi pube ramosa cinerascens flore magnitudine *Kerneriae saxatilis* plus duplo longioribus, sepalis ovato-oblongis, petalis flavis obovatis calycem duplo excedentibus, filamentis subulatis ovario oblongo glabro brevioribus, stylo vix 2 mm. longo ovarii dimidium circiter aequante, ovulis in loculo singulo circiter 6.

VENEZUELA. Prov. de Merida : Sierra Nevada. alt. 3250 m., juin 1847, *Funck & Schlim*, no. 1619.

Par l'ensemble de ses traits, cette espèce se rapproche du *Draba pamplonensis*.

***Draba pseudo-Euryops* Linden et Planch. l.c. 14.**

[Based on *Funck & Schlim* 1606 (pro parte). The species is described as having a short style, not equalling the ovary, and a silicle hardly longer than its pedicel. It is evidently identical with *D. pulvinata* Turcz. (1854), which was founded on part of the same number. Gilg and Muschler in Engl. Jahrb. xlii. 475 cited *Funck & Schlim* 1606 under *D. arbuscula* Hook. f., but omitted to cite *D. pulvinata* as a synonym.]

***Draba dendroides* Linden et Planch. l.c. 15.**

[Founded on *Funck & Schlim* 1606 (pro parte). The species is described as having a very long style, twice as long as the ovary, and a silicle which is only half as long as its pedicel. It is evidently identical with *Dolichostylis Funckii* Turcz. (1854), which was based on part of the same number. Gilg and Muschler appear to have overlooked the genus *Dolichostylis* Turcz. (*Stenonema* Hook.) in their enumeration of South American *Cruciferae* published in Engl. Jahrb. xlii. 437–487.]

**Draba Lindenii** *Planch.* in *Linden et Planch.* 1.c.

Frutescens, ramis inferne denudatis dichotome (?) divisis apice foliosis in racemos bracteatos divisis, foliis confertis linearibus integerrimis glabris, racemis 9–24 cm. longis, rachi pedicellisque (24–36 mm. longis) pube ramosa conspersis, floribus amplis magnitudine illorum *Diplotaxeos tenuifoliae* flavis, petalis calyce duplo longioribus, filamentis subulatis, stylo ovarium glabrum pluries excedente, silicula (immatura) anguste elliptica loculis circiter 6–8-ovulatis.—*Leptonema Lindenii* Hook. 1c. Pl. t. 692.

VENEZUELA. Paramo de Niquitao (prov. de Trujillo), alt. 3570 m., *Linden*, no. 1433, juillet 1843.

Cette remarquable plante, certainement congénère des autres *Draba* d'Amérique, se distingue de la plupart des crucifères par l'existence d'une bractée à la base de chacun de ses pédicelles.

[The genus *Leptonema* Hook., non Juss., was renamed *Dolichostylis* by Turczaninow in 1854, the species becoming *Dolichostylis Lindenii*. In Benth. et Hook. f. Gen. Pl. i. 75 (1862) the genus was renamed *Stenonema* Hook.]

CAPPARIDACEAE.

**Cleome (Gynandropsis) leptorachis** *Linden et Planch.* 1.c. 17.

[Founded on *Linden* 1405, and *Funck & Schlim* 1210, on which numbers *Gynandropsis macrophylla* Turcz. (1854) had previously been based.]

SAMYDACEAE.

**Ryania stipularis** *Linden et Planch.* 1.c. 22.

Ramulis angulatis nervisque foliorum subtus pube stellata adpressissima conspersis, foliis breviter petiolatis oblongis (12–15 cm. longis) eximie cuspidatis integris, stipulis subulatis saepius arcuatis persistentibus petiolo 3–5-plo longioribus, pedunculis axillaribus unifloris brevissimis pedicellis crassis incurvis calyce multo brevioribus, tomento adpresso rufidulo indutis, sepalis oblongo-lanceolatis circiter 3 cm. longis, staminibus crebris calyci subaequalibus, filamentis glabris basi imo tantum pilosis urceolo nectarii laxo ovario brevioris margine fimbriato piloso, ovario hirsuto, stylo. . . . (in specimine deficiente).

VENEZUELA. Forêts sombres du versant nord de la chaîne de Carabobo, alt. 812 m., *Linden*.

Espèce voisine du *Ryania speciosa*, Vahl, dont elle diffère surtout par ses stipules persistantes, plus longues, et par ses étamines à filets glabres.

POLYGALACEAE.

**Polygala plagioptera** *Linden et Planch.* 1.c. 29.

Herbacea humilis ramosa puberula, foliis alternis lanceolato-linearibus breviter petiolatis acutis margine leviter revolutis eglan-

dulosis, racemis axillaribus folium subaequantibus laxe 5-12-floris, bracteis subulatis caducis, pedicellis flore brevioribus floribus flore *Polygalae depressae* minoribus, sepalis internis (alis) oblique rhomboideo-ovatis obtusis basi attenuatis 5-nerviis viridibus apice violascentibus, corolla rosea, petalis lateralibus spatulato-oblongis unguiculatis, superiore galeato-carinato ecristato, capsula obovato-oblonga emarginata glabra alis longiore, seminibus oblongis dense pilosis caruncula compressa galeaeformi ornatis.

NOUVELLE-GRENADE. *Schlim*, sans numéro ni indication de localité.

Apparemment voisin du *Polygala brizoides* A. St.-Hil., mais distinct par ses grappes plus courtes, ses sépales intérieurs manifestement obliques, etc.

***Securidaca densiflora* Linden et Planch. 1.c.**

Scandens, ramis inflorescentiis pedicellis foliisque subtus tomento denso ferrugineo vestitis, foliis breviter petiolatis ovato-oblongis vel oblongis utrinque obtusis margine revolutis chartaceis reticulato-venosis supra nitidis pilosulis, stipulis non conspicuis, forsan intra tomentum occultatis, racemis terminalibus axillaribusque 3-6 cm. longis densifloris, bracteis subulatis caducis, pedicellis confertis flore subtriplo brevioribus, floribus saturate purpureis (vel violascentibus ?) sepalis externis pubescentibus, internis (alis) linea pubescente secus medium notatis, petalis inferioribus cuneato-spatulatis in unguem latum sensim contractis. NOUVELLE-GRENADE. Probablement prov. d'Ocaña, *Schlim* (exemplaire unique, sans numéro).

Voisin du *Securidaca mollis* H.B.K. Il s'en distingue par ses grappes denses, l'absence, au moins apparente, de glandes stipulaires, une ligne de pubescence sur le milieu de chaque pièce interne du calice, ces mêmes pièces plus étroites, etc.

***Securidaca purpurea* Linden et Planch. 1.c. 30.**

Scandens, ramis rufo-velutinis, foliis breviter petiolatis ovatis vel ovato-oblongis basi rotundatis apice obtusiusculis reticulato-venosis supra nitidis pilosulis subtus dense pubescentibus, stipulis minutis pezizaeformibus glabris, racemis terminalibus plurifloris, pedicellis flore brevioribus, floribus saturate purpureis, sepalis externis obtusissimis margine excepto pubescentibus internis (alis) glabris ciliatis, petalis...(in specim. non evolutis).

VENEZUELA. Prov. de Merida, *Linden*, no. 582.

Voisin du *Securidaca volubilis* H.B.K., dont il s'écarte par sa pubescence plus dense, ses sépales externes plus pubescents, ses fleurs d'un pourpre foncé.

***Securidaca rufescens* Planch. et Linden ex Triana et Planch. Prodr. 134 (1862); Linden et Planch. 1.c.**

VENEZUELA. Prov. de Barquisimeto, région chaude, *Linden*, no. 279 ; San Cristobal (prov. de Merida) alt. 812 m., *Funck & Schlim*, no. 1458.

[The type-specimen of *S. rufescens* is presumably *Linden* 279, one of the two Venezuelan specimens from which the description was drawn up. Triana and Planchon l.c., identified a Colombian specimen with *Linden*'s material.]

**Monnina elongata** *Planch. et Linden ex Triana et Planch.* l.c. 137 ; *Linden et Planch.* l.c. 32.

VENEZUELA. San Urbino (prov. de Trujillo), alt. 1300 m., *Linden* no. 375 (exemplaire imparfait) ; *Linden*, no. 339.

NOUVELLE-GRENADE. Prov. de Pamplona, alt. 2600 m. ; La Enllanada (prov. d'Ocaña), alt. 1500 m., *Schlim*, no. 674 ; Prov. d'Ocaña, sans désignation de localité, *Schlim*, nos. 87 et 679 ter.

[Only Colombian localities were cited by Triana and Planchon l.c. In the absence of evidence to the contrary, *Linden* 339 may be regarded as the type-specimen.]

#### CARYOPHYLLACEAE.

**Arenaria humifusa** *Linden et Planch.* l.c. 35.

Humilis glabra, caulibus humifusis ramosis, foliis lanceolato-linearibus sessilibus acutis margine scabriusculis uninerviis crassiusculis, pedicellis axillaribus unifloris folio brevioribus vel parum longioribus, flore magnitudine circiter *Moehringiae trinerviae*, sepalis ovato-oblongis breviter acuminatis acutis uninerviis, petalis calycem paulum superantibus ovatis albis sicut stamina manifeste perigynis, staminibus 10, ovario subgloboso, stylis 3 ovario longioribus ovulis paucis (circiter 20).

Forma  $\beta$ . Nana, caulibus vix 2 cm. longis.

VENEZUELA. Venta de Mucuchies (prov. de Merida), alt. 2400–2870 m. *Linden*, no. 393.—Forma  $\beta$ . Alto del Paramo de Mucuchies, alt. 3250–3900 m., *Linden*, no. 1486.

Cette plante ressemble, par le port, au *Stellaria uliginosa* (*Larbraea aquatica* A. St.-Hil.), dont elle se rapproche aussi par ses pétales et étamines très-franchement périgynes. Ses pétales entiers et l'ensemble de ses traits en font un véritable *Arenaria*.

[Redescribed from *Linden* 393 in 1911 by Briquet in Ann. Conserv. et Jard. Bot. Genève, xiii-xiv. 383, as a new species, *Arenaria venezuelana*.]

**Cerastium meridense** *Linden et Planch.* l.c.

Perenne multicaule (?) caulibus erectis simplicibus, foliis subcuneato-sessilibus inferioribus approximatis subrosulatis caeteris distantibus lanceolato-linearibus acutis utrinque, sicut caulis, pube crispula parce glandulosa laxa indutis, cyma terminali densiuscula pauciflora (rarius ramo altero adjecto bifida), bracteis herbaceis, pedicellis sub anthesi flore brevioribus erectis, floribus magnitudine florum *Cerastii arvensis*, sepalis lanceolatis acuminatis acutis dense glanduloso-pilosis extimis 2 undique herbaceis, intermedio hinc, intimis utrinque margine scariosis, petalis calycem



plus duplo excedentibus anguste cuneato-obovatis emarginatis albis, stylis 5 brevibus.

VENEZUELA. Sierra Nevada de Merida (prov. de Merida), alt. 3250 m. *Funck & Schlim*, no. 1642, *Schlim*, no. 1149.

Très-jolie espèce. Les exemplaires que nous avons sous les yeux ne représentent que des tiges isolées qui partaient probablement d'un rhizome commun. L'une de ces tiges présente, au-dessous de ses grandes feuilles ordinaires, quelques paires de petites squames imbriquées qui semblent caractériser un stolon.

[Redescribed in 1911 by Briquet, l.c. 382, under the name *Cerastium venezuelanum*. Briquet cited the same two collectors' numbers, but attributed them to Linden.]

#### MALVACEAE.

**Malvaviscus Funckeanus** *Linden et Planch.* l.c. 41 ; Gürke in Mart, Fl. Bras. xii. pars. 3, 540.

[Based on *Funck* 372, which is one of the syntype-numbers of *M. cuspidatus* Turcz. (1858).]

**Malvaviscus elegans** *Linden et Planch.* l.c. ; Gürke, l.c. 537.

Ramis petiolis pedicellis calycibusque tomentoso-hispidis, foliis anguste triangulari-cordatis cuspidatis 3-nerviis membranaceis repando-dentatis supra sparse subtus dense stellato-pubescentibus, pedicellis axillaribus petiolum subaequantibus, involucelli foliolis 10-12 linearibus calycem subaequantibus, calycis campanulati ad medium usque 5-fidi laciniis triangulari-lanceolatis subnerviis, corolla calycem plus duplo excedente.

VENEZUELA. La Peña (prov. de Trujillo), alt. 1625 m., août 1846, *Funck & Schlim*, no. 751.

Très-voisin du *Malvaviscus leucocarpus*, dont il s'éloigne par son calice à divisions plus allongées et dépourvues de nervures.

**Malvaviscus speciosus** *Linden et Planch.* l.c. 42 ; Gürke l.c. 538.

Tomentoso-hirtus, foliis cordatis saepius breviter trilobis crenato-dentatis supra sparse pilosis subtus molliter velutinis, pedicellis axillaribus petiolum subaequantibus, involucelli foliolis linearibus acutissimis enerviis calyci circiter aequilongis, calycis campanulati 5-fidi extus piloso-hirti laciniis triangularibus enerviis, corolla coccinea calycem triplo excedente.

VENEZUELA. Forêts de la province de Merida, alt. 1950 m., août 1842, *Linden*, no. 354.

Très-belle espèce, à grandes fleurs pourprées. Elle est très-voisine du *Malvaviscus elegans*, dont elle se distingue par ses feuilles presque toujours trilobées, et surtout par ses calices hispides et non veloutés, à divisions plus courtes et triangulaires.

**Malvaviscus glabrescens** *Linden et Planch.* l.c.

[Based on *Schlim* 105, which is the type-number of *M. oligotrichus* Turcz. (1858) ; Gürke, l.c. 536.]

**Abutilon aurantiacum** *Linden*, Cat. 1858, 11, nomen ; *Linden et Planch.* l.c. 44, descr.

[*Linden* 1503 and *Funck* 753, both from Puerto Cabello, which were the syntype-numbers of *A. aurantiacum* Linden, had previously been cited by Hooker in Bot. Mag. t. 4360 (1848) under *Sida integerrima* Hook. (*Abutilon integerrimum* Triana et Planch. Prodr. 182: 1862.) The combination *Abutilon integerrimum* was ascribed erroneously to Hooker in the Index Kewensis, and to Turczaninov by K. Schum. in Mart. Fl. Bras. xii. pars 3, 387.]

**Abutilon eximium** *Linden et Planch.* 1.c.

[Founded on *Funck & Schlim* 749 and *Linden* 228. The former is the type-number of *A. pyramidale* Turcz. (1858), which is reduced to *A. auritum* Sweet by K. Schum. 1.c. 377.]

#### TILIACEAE.

**Luehea nobilis** *Linden et Planch.* 1.c. 52.

Arbor speciosa, ramulis stellato-hirtellis vel tomentellis, foliis breviter petiolatis ovatis vel rhomboïdeo-ovatis basi interdum leviter inaequali cuneatis vel rotundatis apice acuminatis cuspidatis acutis margine grosse et exserte duplicato-dentatis membranaceis supra viridibus sparse stellato-pilosulis subtus tomento tenui adpresso albidis nervis venisque reticulatis rufescentibus, pedunculo terminali unifloro florem subaequante medium versus tribracteato, flore diametro decimetrali albo, involucelli irregulariter 15–16-fidi vel partiti laciniis linearibus cuspidatis dorso tomento brevi indutis intus secus medium hirsutis, laciniis calycinis lineari-oblongis, petalis cuneato-flabelliformibus apice erosis ?, staminibus externis basi plus minus connexis, capsula acute pentagona apice rostrata circiter 5 cm. longa, diametro fere 2.5 cm. tomento detergili induta.

VENEZUELA. Entre Cabudare et Altar (prov. de Barquisimeto), août 1843, *Linden*.

[*Funck* 180, the type-number of *L. endopogon* Turcz. (1858) is named "*Luhea nobilis* Pl. et Lind." in Planchon's handwriting in the Kew Herbarium ; and *L. nobilis* is given as a synonym of *L. endopogon* on a specimen collected by Triana at Cartagena.]

#### THEACEAE.

**Ternstroemia camelliaefolia** *Linden et Planch.* 1.c. 56.

Glaberrima, foliis obovato-oblongis vel oblongis (10–12 cm. longis) basi acuta in petiolum longiusculum attenuatis apice rotundatis vel obtuse et breviter acuminatis margine obsolete crenulato-revolutis coriaceis siccitate utrinque tenuiter venosis subtus nigro-punctulatis, floribus axillaribus vel e parte denudata ramorum enatis, pedicellis calyce brevioribus subteretibus, bracteis calycinis sepalisque suborbiculatis, petalis late obovatis bilobis margine erosis calyce vix longioribus, bacca sicca ovato-globosa cerasi mole styli basi mucronata.—*Ternstroemia dentata*  $\beta$  *nudiflora* Choisy, Ternstroem. (Genève, 1855, in-4°), p. 18.

VENEZUELA. Galipan (prov. de Caracas), alt. 1624 m., janvier 1846, *Funck & Schlim*, no. 173.

Fleurs blanches.

La brièveté des pédicelles distingue nettement cette espèce du *Ternstroemia clusiaefolia* H.B.K., et du *Ternstroemia peduncularis* DC. La grandeur et la forme des feuilles ne permettent pas de la confondre avec le *Ternstroemia meridionalis* Linn. fil. Elle est plus voisine du *Ternstroemia Purdiaeana* Pl. et Tr., MSS, mais elle en diffère par ses feuilles plus grandes, moins coriaces, plus longuement pétiolées.

M. Choisy rapporte cette plante comme simple variété au *Ternstroemia dentata* Linn. Mais, à en juger par la figure qu'Aublet a donnée de ce dernier (sous le nom de *Taonobo*), il nous semble impossible d'admettre cette détermination spécifique. Les feuilles de notre plante sont à peine légèrement crénelées et non distinctement dentées, comme celles du type *dentata* de la Guyane.

[Fendler 50 and Moritz 1679 (Herb. Kew.), both from Colonia Tovar, are named "*Ternstroemia camelliaefolia* Pl. et. Lind." in Triana's handwriting.]

**Saurauja floribunda** Linden et Planch. 1.c. 57.

Ramis inflorescentiis calycibus adpresse piloso-strigosis, foliis longiuscule petiolatis amplis (2-4 dm. longis) obovato-oblongis breviter cuspidatis acutis basi saepius obtusiusculis margine denticulatis (denticulis incurvis acutissimis) utrinque ad nervos strigosulis caeterum glabris, paniculis axillaribus terminalibus amplis pedunculatis folio brevioribus vel longioribus trichotome cymosis, bracteis linearibus vel lineari-lanceolatis acutis, pedicellis flore longioribus, floribus albis diametro circiter 15 mm., sepalis oblongis obtusis extimis 2 undique dorso strigosis aliis tribus linea dorsali strigosis caeterum albido-tomentellis, petalis oblongis calyce vix longioribus, staminibus basi pilis rufis intermixtis, ovario ovato-subgloboso glaberrimo, stylis stamina superantibus. VENEZUELA. Forêts épaisses de la prov. de Merida, alt. 1950 m., Linden, no. 611 ; près de Merida, Funck & Schlim, no. 898 ; prov. de Merida, alt. 2270 m., Funck & Schlim, no. 1615.

Très-belle espèce, ressemblant au *Saurauja excelsa*, dont elle diffère par les poils couchés et non étalés-crêpus qui revêtent ses divers organes.

[Antedates *S. floribunda* Benth. ex Sprague (1905).]

**Saurauja Goudotiana** Linden et Planch. 1.c. 58.

[Based on Linden 972, which is the type-number of *S. brachybotrys* Turcz. (1858).]

**Haemocharis caracasana** Linden et Planch. 1.c. 59.

Ramis glabris, foliis cuneato-oblongis leviter rhomboïdeo-inaequilateris obtuse acuminatis basi revoluta in petiolum brevissimum attenuatis supra medium hinc serrulatis margine tenui revolutis crassiusculis supra glaberrimis subtus apicem versus in costa adpresse pilosulis subaveniis, pedicellis axillaribus unifloris calyce brevioribus glabris, sepalis 5-6 saepius emarginato-bilobis extus sericeis, petalis 7 inter se inaequalibus obovatis vel oblongis bilobis

dorso medio sericeis albis, ovario ovato sericeo-hirsuto, stylis 5 brevibus glabris. Flores diametro circiter 4·5 cm., albi, odorati. VENEZUELA. Caracas, alt. 1550 m., août 1843, *Linden*. no. 1464.

The type-number is represented in the Kew Herbarium.

**Haemocharis pubescens** *Linden et Planch.* l.c.

[The species was originally published as *Laplacea pubescens* Planch. et Linden in Triana et Planch. Prodr. 266 (1862).]

**Marila magnifica** *Linden et Planch.* l.c. 60.

Arbor ramis compressis sicut inflorescentiae calycesque tomento brevi rufo indutis, foliis amplis (sesquipedalibus et ultra) oblongis breviter acuminatis basi obtusa margine leviter repandis chartaceis, supra (in specim. exsiccato) castaneis nitidis glabratibus subtus rufescentibus, nervis lateralibus numerosis, nervulis transversis subtus prominulis, racemo composito terminali opposite ramoso pedunculato foliis brevioribus, bracteis ad basim pedicelli parvis ovatis, pedicellis crassis calyce reflexo longioribus, sepalis 5 ovatis vel ovato-oblongis, petalis totidem albis cuneato-oblongis calyce parum longioribus, antheris linearibus filamenta vix flexuosa longitudine excedentibus glandula minuta subcapitata apiculatis, stylo brevi crasso ovario pluries brevioribus, stigmate subgloboso, ovario lineari-oblongo 3-loculare.

VENEZUELA. Forêts épaisses et humides entre Campanero et Soledad (prov. de Carabobo), *Linden*.

Voisin du *Marila macrophylla* Benth., dont il se distinguera aisément par son style très-court, au lieu d'être presque égal à l'ovaire.

#### SAUVAGESIACEAE.

**Sauvagesia Brownei** *Planch.* in *Linden et Planch.* l.c. 64, in adnot.; Urb. Symb. Antill. v. 430 (1908).

[Inserted in Index Kewensis, Suppl. 4, with the later reference only.]

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## VI.—MISCELLANEOUS NOTES.

The following appointments have been made by the Secretary of State for the Colonies:—MR. E. H. G. SMITH, B.A., Superintendent, Agricultural Department, Nigeria: MR. W. J. HILL, District Agricultural Officer, Tanganyika Territory: MR. L. LORD, M.A., Divisional Agricultural Officer, Ceylon: MR. C. J. PYM, to be an Inspector of Plants, and MR. E. M. COOK, to be an Assistant Superintendent, Agricultural Department, Gold Coast.



WILLIAM PHILIP HIERN, F.R.S.—We regret to record the death of Mr. W. P. HIERN, which took place at The Castle, Barnstaple, on the 29th of November, 1925. Born at Stafford on the 19th of January, 1839, he entered St. John's College, Cambridge, in 1857, and graduated B.A. as ninth wrangler in 1861, proceeding to M.A. in 1864, and was from 1865 to 1868 a Fellow of his College. In 1868, he incorporated as M.A. at Christ Church, Oxford, about which time he turned his attention to botany and in 1873 published in the Transactions of the Cambridge Philosophical Society a monograph of the *Ebenaceae*. This was followed by accounts of the *Meliaceae* and *Sapindaceae* in Hooker's *Flora of British India*.

In 1873 an action was commenced in the High Court of Chancery by Dom Luis the First, King of Portugal, against William Carruthers and Frederick Justen, executors of Dr. Friedrich Welwitsch, to regain possession of the botanical collections made by the last named in Angola. The action ended in November, 1875, in a compromise declaring that the set of specimens next after the study set was to be presented to the British Museum, and the remainder to be at the disposal of the Portuguese Government. The division of the specimens and copying of the field notes was to be done in this country and Mr. Hiern was nominated by the Court, on behalf of the British Museum, to carry this into effect. This he proceeded to do and published an account of the "*Plants of Welwitsch's Apontamentos*" in the Journal of Botany, 1895, pp. 139-141. This was followed by a "Catalogue of the African Plants collected by Dr. Friedrich Welwitsch in 1853-1861" published to the end of the Dicotyledons between 1896 and 1900 in four parts. The remainder of the collection was dealt with by members of the British Museum Staff.

The greater part of volume iii. of the Flora of Tropical Africa, published in 1877, was written by Mr. Hiern, who alone was responsible for the *Umbelliferae*, *Araliaceae*, *Rubiaceae*, *Valerianaceae*, and *Ebenaceae*, and worked out the *Compositae* in conjunction with Prof. D. Oliver.

In 1881 Mr. Hiern had published, in conjunction with C. Fieahlo, in the Transactions of the Linnean Society a paper "On Central African Plants collected by Major Serpa Pinto". He also contributed various notes to the Journal of Botany. His work on the *Scrophulariaceae* occupied pp. 121-420 of volume iv. part 2, of the Flora Capensis in 1904, but he was obliged to decline the invitation to work out the same family for the Flora of Tropical Africa. After this he became Botanical Recorder for Devon and published a "Clavis to Devonian Sedges", based chiefly on vegetative characters in the Botanical Exchange Club Report, 1918 p. 414, and finally he turned his attention to public administration and became a Justice of the Peace and County Alderman for Devon.

Mr. Hiern was elected a Fellow of the Linnean Society in 1873 and of the Royal Society in 1903, and was also a corresponding

member of the Royal Academy of Lisbon. His wife and only son predeceased him.

C. H. W.

SAMUEL JAMES WHITMEE.—The Rev. S. J. Whitmee, F.R.G.S., whose death took place in London on December 10th, 1925, was a man with many interests. Born at Stagsden, Bedfordshire, in 1838, he went to Samoa in 1863, where, as well as in the neighbouring isles, he worked for fourteen years on behalf of the London Missionary Society. Returning to Europe in 1877, he became successively pastor of the York Street Church, Dublin, and of Arley Chapel, Bristol, but in 1891 again returned to Samoa for the London Missionary Society and worked amongst the foreign residents as well as helping in the mission to the natives. Here he became the close friend of R. L. Stevenson, whom he taught the Samoan language. Between 1872 and 1878 he published many notes in "Nature" on such subjects as "Earthquakes in the Samoan Islands," "Origin of Cyclones," "Meteors in the South Pacific," "The Flora and Fauna of New Guinea and the Pacific Islands," and in vol. xii, p. 291, a criticism (entitled "On the Influence of Volcanic Action in preventing the Growth of Corals") on Prof. Dana's review of Darwin's "Coral Reefs." In 1875 he contributed to "Ibis", vol v., a list of Samoan birds, and in 1878 to the Zoological Society's Proceedings a paper "On the Manifestation of Anger, Fear and other Passions in Fishes." A paper on "The Ethnology of the Pacific" appeared in the Victoria Institute Journal, xiv. pp. 16-31, 1881. In a letter to Sir J. D. Hooker, written from Blackheath in February, 1878, he speaks of sending him a "Comparative Dictionary of Polynesian Languages", which, however, was never published.

Mr. Whitmee's connection with Kew commenced in 1873, when seeds of two Samoan palms were received from him accompanied by a letter stating that he was "trying to make a complete collection of Samoan plants for my friend Dr. von Mueller of Melbourne". Between 1875 and 1878, Whitmee sent nearly 700 specimens to Kew, including 59 collected at his request in the Gilbert, Tokelau and Ellice Groups by Mr. Fritz Jensen and named by Sir F. von Mueller. Two collections of Samoan ferns from Whitmee formed the subject of two papers by Dr. J. G. Baker in the Journal of Botany for 1876, where 14 new species were described, including *Cyathea Whitmei*, *C. scabra*, *Nephrodium pubirachis*, *Oleandra Whitmei* and *Polypodium deltoideophyllum*. These collections are quoted in F. Reinecke's "Die Flora der Samoa-Inseln" in Engler's Jahrbücher, vol. xxiii. A further new species, *Nephrodium chrysotrichum* Baker, was published in the Annals of Botany, v. p. 328. The only new phanerogam appears to have been *Maba samoensis* Hiern, Journal of Botany, 1877, p. 99. Mr. Whitmee returned to England finally in 1894 and spent the latter part of his life at Barnet.

C. H. W.



**Indian Provincial Floras.\***—With the publication of Part i Mr. Haines brings to a conclusion his Botany of Bihar and Orissa. Parts ii to vi, which have been published during the past four years (*K.B.* 1922, p. 304), contain the systematic descriptions of the flora; the present part is a general introduction to the vegetation of the country and the factors influencing its composition and distribution.

Two useful maps are provided, one climatic and one topographical. The territorial limits of the flora are described and the climatic, topographical and geological features are discussed. A discussion on the general character of the flora and its œcology is given, with special notes on the Hazaribagh and Monghyr districts. The author devotes a chapter to a consideration of the principles and systems of classification, with an exposition of the method adopted in the present work, which, with some exceptions, adheres to that of Bentham and Hooker. An annotated conspectus of the Natural Families with a glossary of botanical terms and an index to Part i concludes this part.

Workers on Indian systematic botany in general, and those interested in this region in particular, are appreciative of the care which Mr. Haines has bestowed on this work, and he is to be congratulated on the eminently successful termination of an arduous labour. Not a small part of the value of this Flora is due to the fact that the author has an intimate acquaintance with the living plants described, which he has known personally in their natural habitat. This first-hand knowledge in the field he has supplemented by personal investigation in herbaria and by the scrutiny of type specimens whenever possible. C. E. C. F.

**Nigerian Trees.†**—Mr. Lely's book is a welcome contribution to our knowledge of Nigerian trees. It is only rarely that the field worker can be induced to give descriptions of plants as they grow in their natural habitats, and the present book is fortunately produced by an author who is also able to record his impressions pictorially. For information of the nature given by Mr. Lely one is generally dependent on the very scanty field notes that accompany herbarium specimens, and the drawings too often have to be made from preserved material. Mr. Lely's book will, therefore, be of particular value to the field worker and enable him to identify readily the common trees of the Nigerian savannah. Its sphere will not be limited to Nigeria only, for the same types of vegetation with the same floristic composition extend westwards right across the hinterland, and forest and agricultural officers throughout that region of West Africa will find the book of assistance.

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\* The Botany of Bihar and Orissa, Part i, by H. H. Haines, C.I.E., F.C.H., F.L.S. Adlard and Son and West Newman, Ltd., London, 1925, pp. ix and 199, one map in pocket. Price Rs. 8.

† The Useful Trees of Northern Nigeria, by H. V. Lely. The Crown Agents for the Colonies, 4, Millbank, Westminster. 1925. Pp. 128, text figs. 120. Price 10s.

The Preface contains a brief description of the country in which the author has worked—between  $9^{\circ}$  and  $14^{\circ}$  N. in Nigeria—and the general conditions of local agricultural practices and their relation to the savannah forests. He distinguishes two types, the woodland with a light though closed canopy, which he calls “tree savannah,” and the parkland, of isolated trees growing in the grass, which he terms “bush savannah.” He recognises four edaphic subtypes and comments on the occasional patches of pure forest that occur and on the recognition of Plant Indicators.

The descriptions, which are written to a uniform schedule to assist comparison of species, are arranged alphabetically, and contain general notes and successive paragraphs on the bark, wood, leaves, flowers, fruits and any peculiar characteristics.

The most valuable contribution of the book is the full page of outline drawings which accompanies the description of each species, and which will enable anyone in the country to recognise the trees without difficulty. An Appendix gives in tabular form the flowering seasons of the species described and there is also an Index of Hausa names.

The author is to be congratulated on the production of this well-illustrated book, which will be of much assistance to the field worker in the savannah country in West Africa.

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**Herbaceous Borders\*.**—This small book deals in a very concise and lucid manner with the many problems that vex the suburban gardener in the neighbourhood of large towns. Thorough cultivation at the beginning is rightly advised, as well as the use of lime, which is so important for the acid-laden soils of gardens in, or in close proximity to, large towns. The selection, arrangement, and maintenance of plants suitable for the small garden is discussed, and a series of tables gives the various plants arranged under the headings of tall, medium, and dwarf, the plants in each section being grouped under their respective colours.

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We record with great regret the death of Mr. J. H. MAIDEN, I.S.O., F.R.S., on the 16th November last. A notice of his contributions to botanical science will appear in the next number of the Bulletin.

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\* *Herbaceous Borders for Amateurs*, by R. V. Giffard Woolley. Country Life, Ltd., 20, Tavistock St., Covent Garden. 1926. Pp. 118, ill. 15. Price 5s.